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TARGET SIGNATURE ANALYSIS CENTER:

DATA COMPILATION

Tenth Supplement

Infrared and Optical Sensor Laboratory
Willow Run Laboratories
Institute of Science and Technology
The University of Michigan
Ann Arbor, Michigan

July 1969

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Air Force Avionics Laboratory
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NOTE TO USERS

Target Signature Analysis Center: Data Compilation is a periodically updated publication of the optical and microwave target and background data stored on magnetic tape at the Target Signature Analysis Center established at The University of Michigan and sponsored by the Air Force Avionics Laboratory. Separate volumes are maintained for classified and unclassified data. The compilation is distributed in loose-leaf form so that supplemental publications can be readily integrated in accordance with the established indexing system. The complete publication history of the Target Signature Analysis Certer: Data Compilation is summarized in the foreword to the enclosed document.

This present document is the fifth publication of unclassified data and the eleventh publication in the overall compilation. It consists of optical data, revised explanatory text, and composite cross indexes, and is meant to be integrated with the previous unclassified publications. The following suggestions are made for revising the existing unclassified Data Compilation and adding the enclosed material.

(1) Remove and destroy previously published cover, Notices, title page, Foreword, Abstract, Contents, and List of Figures (all dated January 1969). Insert corresponding new pages, supplied herewith.

(2) Remove section 2 (Cumulative Subject Cross-Index, pp. 2-1 through 2-9, January 1969) from previously integrated compilation. Insert new section 2 (pp. 2-1 through 2-9, July 1969).

(3) From section 3 of the compilation, remove pp. 3-27 through 3-30 (January 1969) and insert corresponding pages dated July 1969.

(4) Following p. 3-31, insert new data sheets in the appropriate subject categories. These may be determined by the alphanumeric code at the top of each data sheet. The alphabetic code indicates the subject category and the numeric suffix indicates the sequence of the data sheet in its appropriate category.

(5) Remove distribution list from the compilation and insert new distribution list.

(6) Remove DD form 1473, and replace it with new page supplied herewith.

July 1969

TARGET SIGNATURE ANALYSIS CENTER:
DATA COMPILATION
Tenth Supplement

July 1969

[redacted], this document is subject to special export controls and each transmittal to foreign governments or foreign nationals may be made only with prior approval of AFAL (AVPT), WPAFB, Ohio.

FOREWORD

This is the eleventh publication overall and the fifth unclassified publication of the Target Signature Analysis Center: Data Compilation (July 1966). It was prepared at the Willow Run Laboratories, a unit of The University of Michigan's Institute of Science and Technology. The preparation was begun under Air Force Contract AF 33(657)-10974 and continued under Contracts AF 33(615)-3654 and F33615-67-C-1293. The originator's report number is 8492-49-B. The work was administered under the direction of the Air Force Avionics Laboratory, Research and Technology Division, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio, with Mr. William Caulfield as the project engineer.

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TARGET SIGNATURE ANALYSIS CENTER: DATA COMPILATION

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Tenth Supplement	July 1969	8492-49-B	-
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Third Supplement	October 1967	8492-12-B	AD 384 874
Fourth Supplement	December 1967	8492-14-B	AD 391 239
Sixth Supplement	November 1968	8492-25-B	AD 394 783
Eighth Supplement	January 1969	8492-43-B	-
Ninth Supplement	July 1969	8492-48-B	-

ABSTRACT

This supplement to the Target Signature Analysis Center: Data Con., ilation augments an ordered, indexed compilation of reflectances and radar cross sections of target and background materials. The Data Compilation includes spectral reflectances and transmittances in the optical region from 0.3 to 15 μ and normalized radar cross sections (active) plotted as functions of aspect or depressing angle, at millimeter wavelengths When available, the experimental parameters associated with each curve are listed to provide the user with a description of the important experimental conditions.

This supplement contains an additional 350 reflectance curves in graphical form. These data were obtained from the Laboratory Measurements Phase of the Target Signature Measurements Program conducted at The University of Michigan and sponsored by the Air Force Avionics Laboratory. The unclassified compilation, including these data, consists of about 4650 curves and 112 tables.

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Platinum . . . . . AEL 10, 11
AEM 105
Platinum Paint . . . . . AEM 100, 101
Plum . . . . . BG 7
BGD 227, 230, 231, 374
Podsol . . . . . AAG 2
BFA 1-5
Pond . . . . . See Water
Poplar . . . . . BGD 262-288, 382, 383
Porphytic . . . . . BFHD 9
Potassium Nitrate . . . . . BFK 2
Potato . . . . . BGC 1, 104, 179, 180
Pottery . . . . . AER 2
Primer . . . . . AEM 26, 37
Pyrite . . . . . BFK 3

Quartz . . . . . BFK 3
Quartzite . . . . . BFHD 6, 11, 12

Ragweed . . . . . BGC 1
Railroad 3135: 7
Rayon . . . . . AAKA 32, 34, 36
Redbud . . . . . BGD 373
Reeds . . . . . BGC 65
Reflectance Standards
Aluminum Mirror . . . . . CJ 9
Fiberfrax . . . . . CJ 10, 11, 15-32
(f)CJA 8-25
Magnesium Oxide . . . . . CJ 7, 14
(f)CJA 1-6
Velvet Paint (3M) White . . . . . (f)AEL 4-9
Reindeer Moss . . . . . BGA 1
Residential Area 3202: 1, 2
Resin Paint . . . . . AEM 68, 76, 77, 85, 86, 90, 91
Rhodium . . . . . AEL 11, 12, 46
Rice . . . . . BGC 66
River . . . . . See Water
Roads . . . . . AAA 1
AAG 1-5
(Also see Pavement and specific road materials, e.g., Asphalt, Cinder, Concrete, Gravel, Dirt, etc.)
Rock . . . . . AEK 1
BE 11
BFHD 1
Roofing Materials . . . . . AAA 1, 2
AER 1
Rubber . . . . . AEP 1, 2
Rubber Leaf . . . . . BGD 106, 353-355
Runway . . . . . AAE 1
Rust . . . . . AE 2
AEL 5
Rye . . . . . BGC 66, 67
Rye Grass 3133: 24, 25

Sagebrush . . . . . BGD 35

Salt . . . . . BE 7, 15
BF 17
BFK 2
3131: 58
Sand . . . . . See Soil
Sandstone . . . . . BFHD 5
Sandy Loam . . . . . See Soil
Sapphire Felt . . . . . CJ 10, 11
Saran . . . . . AEM 52
Sassafras . . . . . BGD 55, 344
Sauereisen . . . . . AE 3
Sawdust . . . . . AE 2
Sea . . . . . BH 6
3123: 1-15
Sedge . . . . . BH 2, 3
BGC 143
Selin . . . . . BGC 68
Shale . . . . . BF 17
Shellac . . . . . AEM 90
Shingles . . . . . AAA 1
Silt . . . . . BF EC 1
Siltstone . . . . . BFHD 6, 8, 11
Silt Loam . . . . . BFEB 1-11
Silty Clay Loam . . . . . BFFC 1
Silver . . . . . AEL 12, 13, 37-40
Silver Paint . . . . . AEM 101
Skin
Caucasian . . . . . AAK 1, 2, 4, 5, 7
Negro . . . . . AAK 1, 3-7
Oriental . . . . . AAK 3
Sky . . . . . (P)BAB
Snow . . . . . BH 7-14
3133: 28, 34, 38, 47, 51
3290: 37-39
Sod . . . . . (f)BGCM 1-6
Sodium Carbonate . . . . . BFK 1
Sodium Chloride . . . . . BFK 2
Sodium Nitrate . . . . . BFK 1
Sodium Silicate . . . . . AEH 2
BFK 2, 3
BFL 1, 2
Soil
Clay . . . . . BFGC 1-5
3131: 31-43
Clay Loam . . . . . BFFA 1-10
Cultivated . . . . . BFA 1-7
BFDA 6-8
3131: 44-52
Dirt . . . . . AAG 1-3
AEH 2
AEM 54, 67
3290: 52, 53
Fine Sandy Loam . . . . . BFDB 1-6
Lava . . . . . BFHD 2
Loam . . . . . BFEA 1-9
Loamy Sand . . . . . BFCB 1
Loess 3131: 53-58
Miscellaneous . . . . . BF 1-21
Rock . . . . . AEK 1
BE 11
BFHD 1
Sand . . . . . AEM 67
BE 1-3, 5, 6, 9-11
BFCA 1-14
3131: 1-30
(Also see Desert)
Sandy Loam . . . . . AAG 1
BFDA 1-8
3133: 29-39, 42-46
Shale . . . . . BF 17
Silt . . . . . BFEC 1
Silt Loam . . . . . BFEB 1-11
Silty Clay Loam . . . . . BFFC 1
Sorghum . . . . . BGC 9-12
Soybeans . . . . . BGC 116-141
3133: 52, 54, 55, 59, 60, 77-79
Sphagnum Moss . . . . . BGB 1, 2
Spruce . . . . . BGD 195, 196, 361, 406, 407
Squash . . . . . BGC 8
Stainless Steel . . . . . AEL 1, 13, 15, 20, 25, 28, 44, 45
Steel (Mild) . . . . . AEL 5, 35-39
Stones . . . . . BFHD 1
3290: 44-47
Straw . . . . . AAA 1, 2
BG 1
BGC 65, 67, 99, 113
Stream . . . . . See Water
String Beans . . . . . BGC 141, 142
Sudan Grass 3133: 8-11
Sugar Beet . . . . . BGC 6-8
Sulphur . . . . . BFL 1
CJ 9
(f)CJA 7
Sumach . . . . . BGD 33, 34
Sunflower . . . . . BGC 1
Swamps . . . . . See Marsh
Sweetgum . . . . . BG 5
BGD 291-302, 374
Sweet Potato . . . . . BGC 1
Sycamore . . . . . BGD 196-223, 361-372, 407, 408
Tantalum . . . . . AEL 47-49
Tape (Cloth) . . . . . AE 2
Tar . . . . . AEQ 1, 2

Targets . . . . . See Ground Targets and specific types of targets
Tar Paper . . . . . AEQ 2
Tarpaulin . . . . . (f)AEE 1, 2
Target Materials . . . . . See specific materials such as Asphalt, Brick, etc.
Target Materials (Misc.) . . . AE 1-3
Terra Cotta . . . . . AE 1
Terrain . . . . . BE 1-14
BF 10-13
Flat . . . . . BE 2-7
Hilly . . . . . BE 7, 8
Ice, Water, and Land 3154: 1-3
Mountains . . . . . BE 9-11
3137: 2, 7-11
Rural . . . . . BE 12-14
Water and Land 3152: 1
Water, Ice, Land, and Small Buildings 3303: 1
Wooded . . . . . BE 1, 8
BH 9
3132: 1
3134: 1-7
3136: 3
Tile . . . . . AER 1-3
Timothy . . . . . BGC 68-70
Titanium . . . . . AEA 6
AEL 3-5, 16-19, 32-35, 45
Titanium Dioxide . . . . . CJ 11
Tomato . . . . . BGC 104, 105
Tourmaline . . . . . AEM 67
Tree . . . . . BE 4
BGD 1, 2, 6, 22, 23, 196, 259
Tropical Vegetation . . . . . BG 1, 5
BGD 2, 106
Truck . . . . . AALF 1
Tuff . . . . . AE 1
Tulip . . . . . BGD 70, 71
Tulip Poplar . . . . . BGD 71, 72
Tupelo Gum . . . . . BGD 231
Turpentine . . . . . AEM 52, 89
Uniforms . . . . . AAKA 1-57
Vegetation
Alder . . . . . BGD 46
Alfalfa . . . . . BGC 106-111
3133: 45, 52, 53, 57, 62, 65, 67, 77
3135: 1
Apple . . . . . BG 7, 8
BGD 225, 374
Ash . . . . . BGD 107, 121
3134: 7
Aspen . . . . . BGD 258-261, 376-382
Balsam Poplar . . . . . BGD 263
Bark . . . . . BGD 9, 12, 51, 71, 196, 225, 227, 229, 231, 233
Barley . . . . . BGC 31-35
Basswood . . . . . BGD 56, 68, 345
Beech . . . . . BGD 2, 6, 317, 320
Bermuda Grass . . . . . BGC 35
3133: 13
Birch . . . . . BGD 47, 51, 342
3134: 7
Birdsfoot Tufoil . . . . . BGC 106
Blackberry . . . . . BGD 226
Bracken Fern . . . . . BGC 3
Bramble Briar . . . . . BGD 225
Bromegrass . . . . . BGC 12
Buckeye . . . . . BGD 303
Burdock . . . . . BGC 146
Cabbage . . . . . BGC 103, 104
Calabash . . . . . BGD 232
Catalpa . . . . . BGD 30-32, 336
Cedar . . . . . BGD 122, 123, 358, 404
Cherry . . . . . BGD 226, 227, 230
Chestnut . . . . . BGD 320
Chinese Pistachio . . . . . BGD 33
Clover . . . . . BGC 68-70, 111, 112
Cocklebur . . . . . BGC 145
Coconut Palm . . . . . BGD 316, 317
Coffee . . . . . BGC 112
Coleus . . . . . BGD 304-314
Corn . . . . . BGC 35-55, 148, 149, 181-183
3133: 62-64
3135: 1
Cotton . . . . . BGC 99-102, 159-179
CJ 12
3133: 56, 57
Cottonwood . . . . . BGD 235-258, 375, 376, 408, 409
Crow Foot . . . . . BGC 2
Daisies . . . . . BGC 1
Dieffenbachia . . . . . BGD 315
Dogwood . . . . . BGD 36-43
Dracaena . . . . . BGC 145
Duckweed . . . . . BGC 2
BH 2
Elm . . . . . BG 8
BGD 45, 46, 337-340
3134: 7
Fallow . . . . . BG 4

Fern	BGC 181
Fescue	BGC 56
Field	AAA 1 BE 3, 4, 11-14 BG 3, 4 BGC 2, 13, 15-28, 65, 68-70, 113, 143 3133: 1-82
Fir	BGD 123-125 3134: 6
Flax	BGC 3, 4
Foxtail	BGC 56, 57
Geranium	BGD 303, 304, 312, 313
Ginkgo Biloba	BGD 303
Goldenrod	BCD 34
Grass	BG 4 BGC 9, 12-31, 35, 55, 56, 58-60, 143, 146-148 3133: 1-11, 13-24, 29-34, 38-44, 46-49, 52, 53, 57-61, 63, 66, 77
Haloxylon	BG 8
Hawthorne	BGD 227
Hay	BG 9 (Also see Straw)
Hazelnut	BGD 51, 52
Heather	BGC 99
Hemlock	3134: 7
Hibiscus	BGC 158, 159
Hickory	BGD 232, 234
Holly	BGD 54
Hornbean	BGD 53
Ilyas	BGC 58, 59
Indian Mallow	BGC 158
Ironwood	BGD 44
Juneberry	BGD 228
Juniper	BGD 125, 126, 358, 359
Larch	BGD 126, 127
Lentil	BGC 113
Lichens	BG 9
Lilac	BGD 356, 357
Lima Beans	BGC 113, 114
Linden	BGD 69
Locust	BGD 223, 224
Madrone	BGD 342, 343
Magnolia	BGD 70, 345
Manzanita	BGC 156, 157
Maple	BGD 72-106, 345-353, 400, 402, 405
Marsh Grass	3136: 2, 3
Merion Blue Grass	(f)BGCM 1-6
Mesquite	BGD 223
Milkweed	BGC 144
Millet	BGC 61
Mint	BGC 144
Mockernut	BGD 233
Moss	BFHD 2 BG 2, 4 BGA 1 BGB 1-3
Mountain Laurel	BGD 53-55
Mulberry	BGD 353 (f)BGDV 1-6
Mullein	BGD 341
Mustard	BGC 104
Oak	AET 1 BGD 7-29, 320-336, 384-400, 402 3134: 4
Oats	BGC 62-65 3133: 56, 71, 75, 82
Palm Branch	BGD 411-413
Pea	BGC 114
Peach	BGD 228, 229
Peanuts	BGC 114-116
Pear	BGD 226
Persimmon	BGD 44
Philodendron	BGD 316
Pigweed	BGC 5
Pine	BE 8 BGD 127-195, 359, 360, 403-406 3132: 1 3134: 4, 6, 7
Pinyon	BGD 121, 122
Plantain	BGC 142
Plum	BG 7 BGD 227, 230, 231, 374
Poplar	BGD 262-288, 382, 383
Potato	BGD 1, 104, 179, 180
Ragweed	BGC 1
Redbud	BGD 373
Reeds	BGC 65
Reindeer Moss	BGA 1
Rice	BGC 66
Rubber Leaf	BGD 106, 353-355
Rye	BGC 66, 67
Rye Grass	3133: 24, 25
Sagebrush	BGD 35
Sassafras	BGD 55, 344
Sedge	BGC 143 BH 2, 3
Selin	BGC 68
Sorghum	BGC 9-12

Soybeans . . . . . BGC 116-141
3133: 52, 54, 55, 59, 60, 77-79
Sphagnum Moss . . . . . BGB 1, 2
Spruce . . . . . BGD 195, 196, 361, 406, 407
Squash . . . . . BGC 8
Straw . . . . . AAA 1, 2
BG 1
BGC 65, 67, 99, 113
String Beans . . . . . BGC 141, 142
Sudan Grass 3133: 8-11
Sugar Beet . . . . . BGC 6-8
Sumach . . . . . BGD 33, 34
Sunflower . . . . . BGC 1
Sweetgum . . . . . BG 5
BGD 291-302, 374
Sweet Potato . . . . . BGC 1
Sycamore . . . . . BGD 196-223, 361-372, 407, 408

Timothy . . . . . BGC 68-70
Tomato . . . . . BGC 104, 105
Tree . . . . . BE 4
BGD 1, 2, 6, 22, 23, 196, 259
Tropical Vegetation . . . . BG 1, 5
BGD 2, 106
Tulip . . . . . BGD 70, 71
Tulip Poplar . . . . . BGD 71, 72
Tupilo Gum . . . . . BGD 231
Vetch . . . . . BGC 70
Viburnum . . . . . BGD 33
Virginia Creeper . . . . . BGD 232. 375
Walnut . . . . . BGD 232
Weeds . . . . . BG 3
BGC 1
BH 2, 3
3133: 11, 12, 26, 27. 38, 44
Wheat . . . . . BGC 70-99, 150-156
3133: 68-70, 80-82
3135: 1

Willow . . . . . BGD 289, 290
Wormwood . . . . . BGD 35, 36
Yantak . . . . . BG 4
Yucca . . . . . BGD 56
Vehicles . . . . . AALF 1
Velvet Paint (3M) Black . . . . (f)AEM 10-19
Velvet Paint (3M) White . . . . (f)AEM 4-9
Vetch . . . . . BGC 70
Viburnum . . . . . BGD 33
Vinyl . . . . . AAKA 6
AEO 2-5
Virginia Creeper . . . . . BGD 232, 375

Walnut . . . . . BGD 232
Water . . . . . BF 13
BG 2
BGC 65
BH 1-14
3123: 1-15
3136: 2, 3
Weeds . . . . . BG 3
BGC 1
BH 2, 3
3133: 11, 12, 26, 27, 38, 44
Wheat . . . . . BGC 70-99, 150-156, 3133: 68-70, 80-82
3135: 1
Willow . . . . . BGD 289, 290
Wood . . . . . AAA 2
AAG 5
AAH 1
AET 1-3
Wood Stain . . . . . AEM 4
Wool . . . . . AAKA 1-2, 6-14, 33, 36
Wormwood . . . . . BGD 35, 36

Yantak . . . . . BG 4
Yucca . . . . . BGD 56

Zinc . . . . . AEL 19
Zinc (Galvanite) Paint . . . . . AEM 38
Zinc Oxide (Zinc White) . . . . AEM 6-9, 18, 19

B-14004 Williamson: Night Reconnaissance Subsystem (U), (Final Technical Documentary Report), Martin-Marietta Corp., Orlando, Fla., November 1964, AD 355 324 (CONFIDENTIAL).

Platform: laboratory
Instrument 1: Carv Model 14R spectrophotometer

Quantity measured: ρ_d
Wavelength range: 0.2 to 2.2 μ
Reflectance attachment: integrating sphere

Reflectance standard: $MgCO_3$
Additional reference: 3-11
Comments: see discussion in section 3.2.9.
Instrument 2: Perkin-Elmer normal incidence spectrophotometer

Quantity measured: ρ'
Wavelength range: 0.2 to 0.42 μ
Reflectance attachment: Perkin-Elmer reflectance unit

Reflectance standard: $MgCO_3$
Comments: see discussion in section 3.2.10.

B-14438. Report on Measurement on the Paint of Russian and Danish Warships (U), Research on Camouflage Spectral Analysis (U), Danish Defence Research Board, Copenhagen, Denmark, 1964 (estimated), AD 370 905L (SECRET).

Platform: laboratory
Instrument: Beckman DU spectrophotometer

Quantity measured: reflectance; however, it was not specified whether directional or bidirectional
Wavelength range: 0.4 to 1.15 μ
Reflectance attachment: not specified

Reflectance standard: not specified, but probably MgO as was used in B-11356
Comments: Very little documentation of experimental procedure was given. These data, therefore, should only be used qualitatively.

B-19999. Trytten, Flowers: Reflectance of Target and Background Materials (unpublished data), Willow Run Laboratories of the Institute of Science and Technology, The University of Michigan, Ann Arbor (CONFIDENTIAL).

Platform: laboratory
Instrument: Beckman DK-2 spectrophotometer

Quantity measured: ρ_d, τ_d
Wavelength range: 0.28 to 2.6 μ
Reflectance attachment: integrating sphere

Reflectance standard: MgO for ρ_d, but values of τ_d are absolute
Comments: See discussion in section 3.2.2. For transmittance measurements, the sample was positioned at the entrance ports of the integrating sphere, and MgO was placed at both the sample and reference ports. Thus energy transmitted into a hemisphere was seen by the detector.

3.5. DATA FORMAT

In order to transfer a data curve from a source document to the Target Signature Library, the curve is first semi-automatically digitized and keypunched on IBM cards. Great care is exercised to preserve all significant details of the original curve except those attributable to instrument noise. Data points are taken in such a way that the new curve formed by connecting the data points with straight lines will duplicate the original curve. In essence, this amounts to taking data points at all significant inflection points on the original curve, so that relatively few data points are required to describe a smooth curve, although many points may be required to describe a highly erratic curve. The keypunched cards are the mechanism for transferring the data to magnetic tape in the Target Signature Library and for printing out data curves in a standard format on a plotting machine.

The header information above each of the data curves includes the curve's identification number, the curve's title, subject codes, and parameter information. The identification number consists of nine characters. The first of these is an alphabetic symbol, and the remaining eight are numeric. The alphabetic symbol is to designate the original source of the data and to differentiate between measurements coordinated under the Air Force Target Signatures Program and those obtained from other sponsored efforts. To date, six different symbols have been defined. These are:

A = U of M, Willow Run Laboratories
B = Target Signature Document Library Reports
C = U of M, School of Natural Resources
D = National Bureau of Standards
E = Texas Instruments Incorporated
F = General Dynamics/Convair

Symbols A, C, D, E, and F are used as the prefix of the identification number only when measurements made by the corresponding agencies have been coordinated under the Target Signatures Measurements Program. When these symbols are used, the next five digits designate a specific sample which has been registered at The University of Michigan. For these, a complete sample description is maintained on file by TSAC. The last three digits in the identification number are used to identify a particular area of the sample of a particular condition of measurement. Thus, for all measurements coordinated directly by TSAC, the following holds true:

(1) All measurements of the same sample are linked together by ID, regardless of where the measurements were made.
(2) Parametric studies (such as moisture content, contamination) on the same sample may be readily identified by the last three digits.
(3) Uniformity of descriptive information is obtained for data on the same samples.

The symbol B is used to identify data taken from reports or data which were obtained prior to the sample registration system. In these cases, the first five digits identify the document from which the data were taken. (Section 3.4 lists the document by the letter B and these five digits.) The last three digits identify a particular curve within the source document.

The subject code is a group of letters assigned to each curve to permit retrieval by subject. Each letter represents a specific descriptor, and each curve is assigned as many letters and as many codes as are required to describe it adequately. The Target Signature Subject-Code List (table 1-1) explains these codes. As an example, a curve may be described as follows:

Object measured: loam (BFEA)
Instrumentation: General Electric spectrophotometer (CDB)
Experimental platform: Laboratory (CED)
Quantity measured: Directional reflectance with the specular component included in the measurement (DFAA)
Reflectance standard: MgO (DFCE)
Spectral interval: 0.4 to 0.7 μ (ECB) and 0.7 to 1.5 μ (ECCA)

The conditions of the experiment, called parameter information, are also listed on the printed header in abbreviated form. This information is derived from the original source when possible. For many of the data, very few parameter entries appear either because the source did not document all of the experimental parameters or because some parameters are not applicable to all measurements, e.g., altitude and range are not parameters for laboratory measurements. Table 3-1 is the key for interpreting this parameter information. Figure 3-18 illustrates the angle parameters pertinent to some measurements.

The optical data in this section are arranged according to the subject code most descriptive of the object or sample measured. Since the Target Signature Subject-Code List contains a large number of specific types of target and background categories, it was necessary in some cases to group the data into somewhat broader categories. These are cross-indexed by subject in section 2.

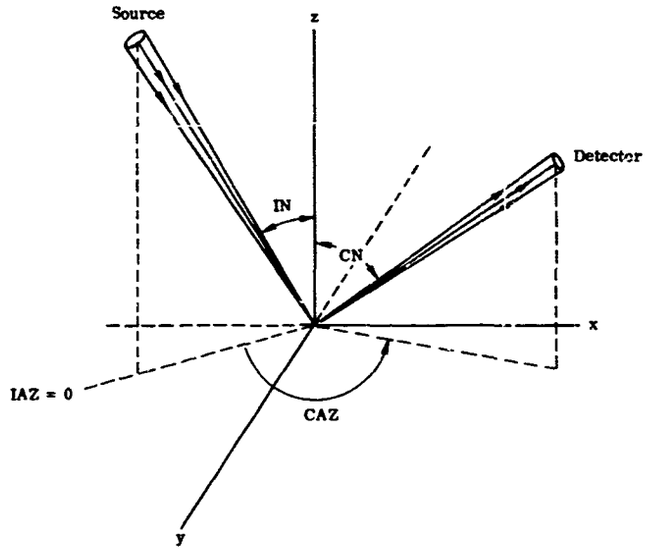


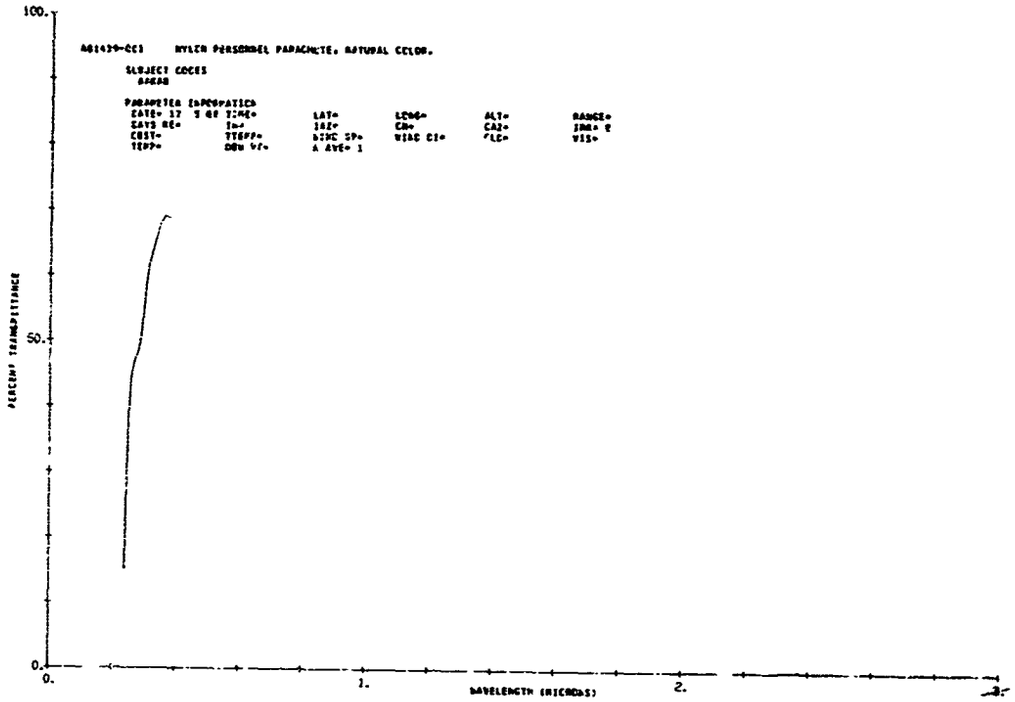
FIGURE 3-18. GEOMETRY FOR SOME SPECIFIED OPTICAL DATA PARAMETERS

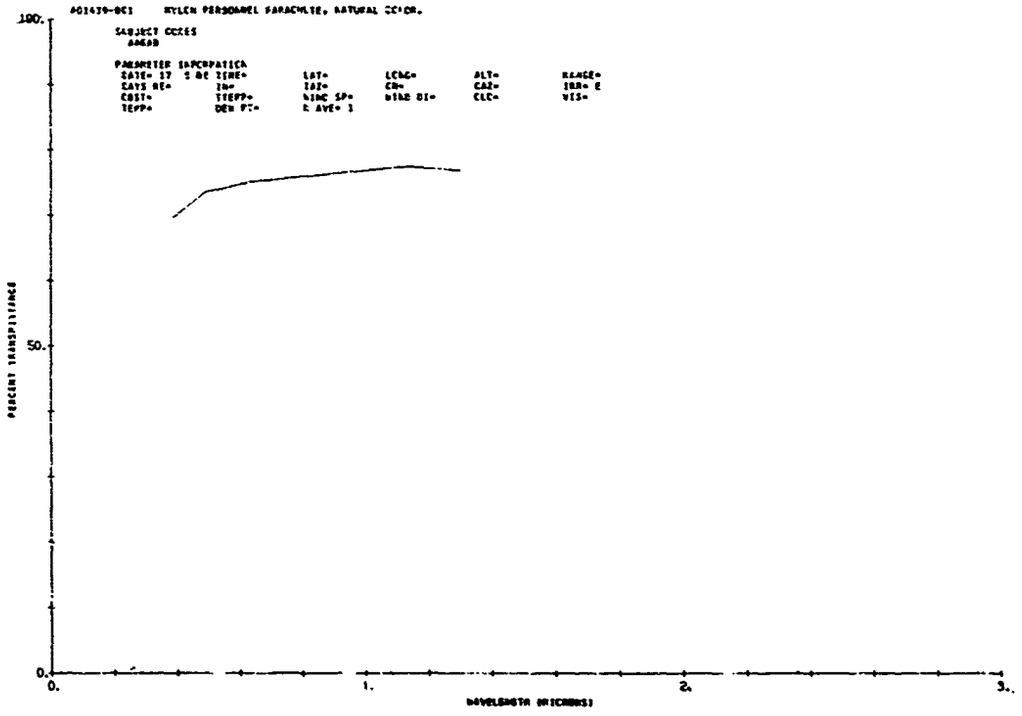
TABLE 3-1. OPTICAL DATA PARAMETERS

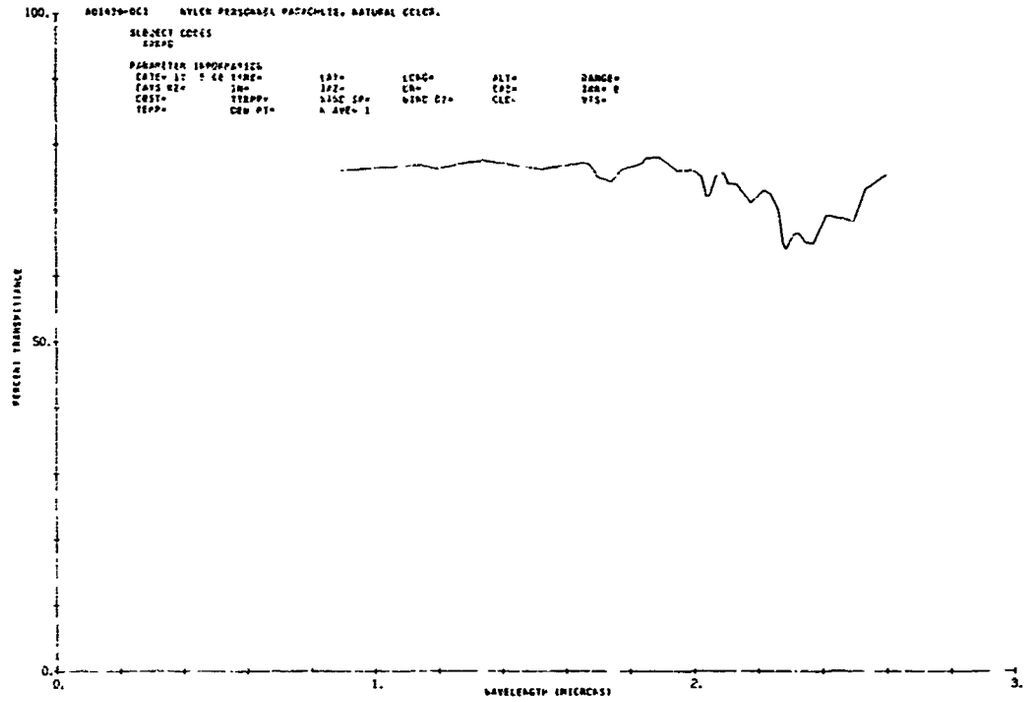
DATE	Date of measurement (day, month, and year)
TIME	Time of measurement (24-hour clock)
LAT	Latitude of measurement (field measurement) or of location at which specimen was collected (laboratory measurement)
LONG	Longitude of measurement or of location at which specimen was collected, as with LAT
ALT	Altitude of experimental platform (thousands of feet)
RANGE	Slant range (thousands of feet)
DAYS RE	Number of days sample had been removed from its natural environment
IN*	Incidence angle (degrees from normal)
IAZ*	Azimuth of incident radiation (degrees)
CN**	Collection angle (degrees from normal)
CAZ**	Azimuth of collection angle (degrees)
IRR	Type of target irradiation coded as follows: A Sun B Moon C Skylight (extended source) D Laser E Other artificial point sources
OBST	Obstructions in the air that prevent a clear view of the target, coded as follows: A Smoke B Haze C Dust D Sand E Fog F Drizzle G Rain H Snow I Hail
TTEMP	Temperature of target or measured object (°K)
WIND SP	Average wind speed (mph)
WIND DI	Wind direction
CLL	Total cloud cover coded as follows: A 0 to 0.1 B 0.2 to 0.5 C 0.6 to 0.8 D 0.9 to 1.0
VIS	Visibility (miles)
TEMP	Temperature of environment (°F)
DEW PT	Dew point temperature (°F)
N AVE	Number of curves or measurements averaged to make up this curve

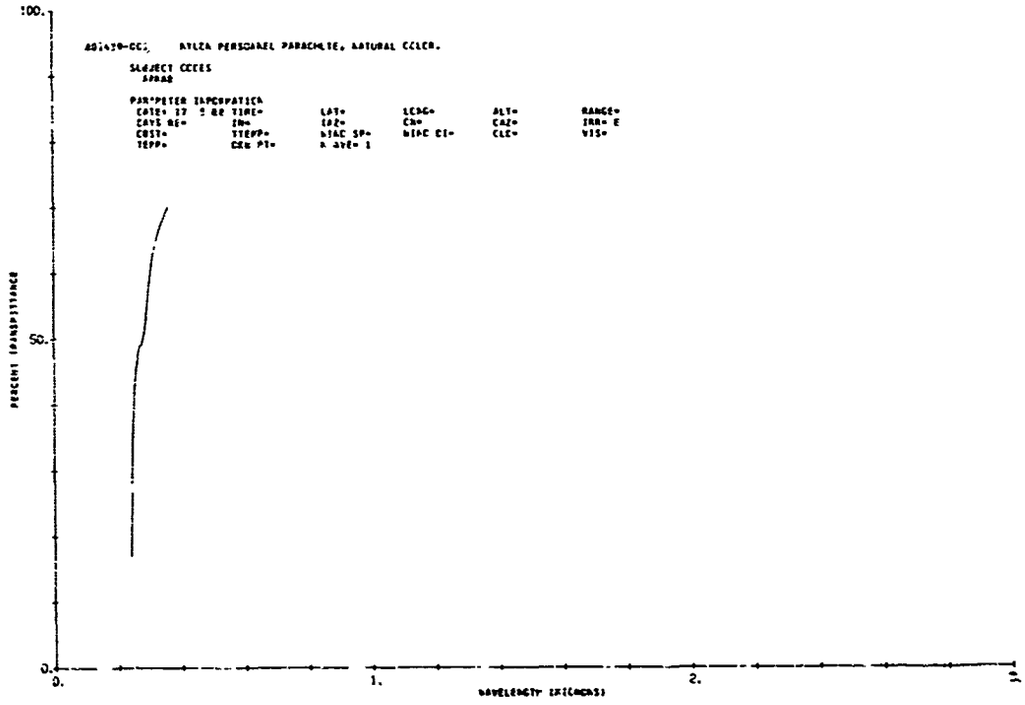
*These angles are defined only if the major portion of radiation incident on the target comes from a point source, e.g., the sun (see fig. 3-18).

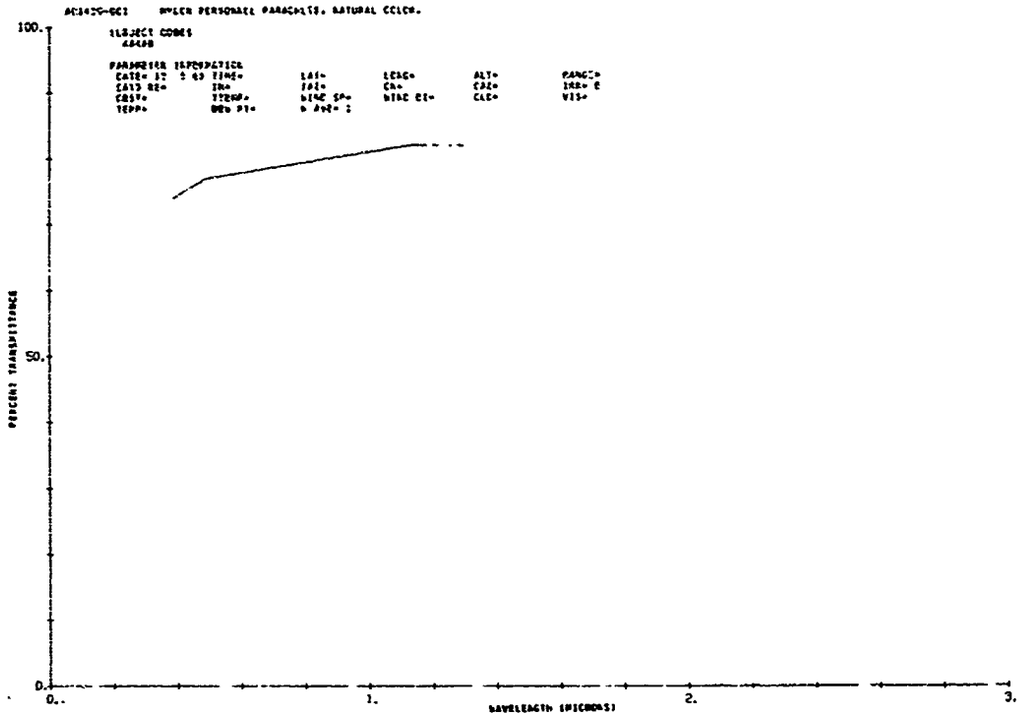
**These angles are defined when the target is observed from one direction (see fig. 3-18).

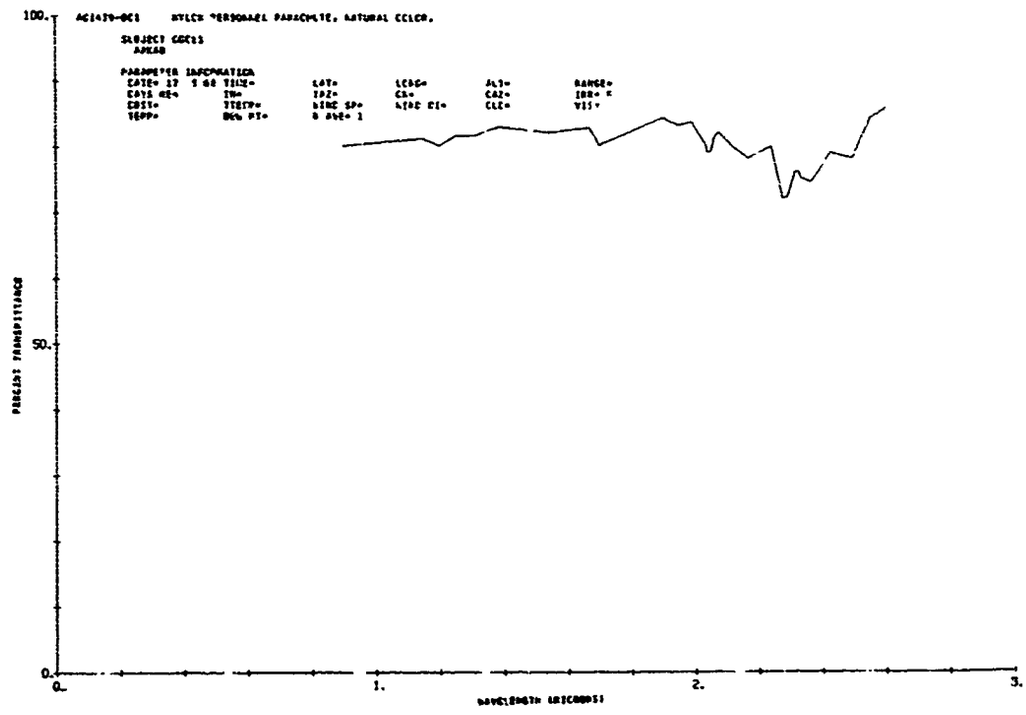

100.
50.
0.
0.
1.
2.
3.
PERCENT TRANSMITTANCE
WAVELENGTH (MICRONS)

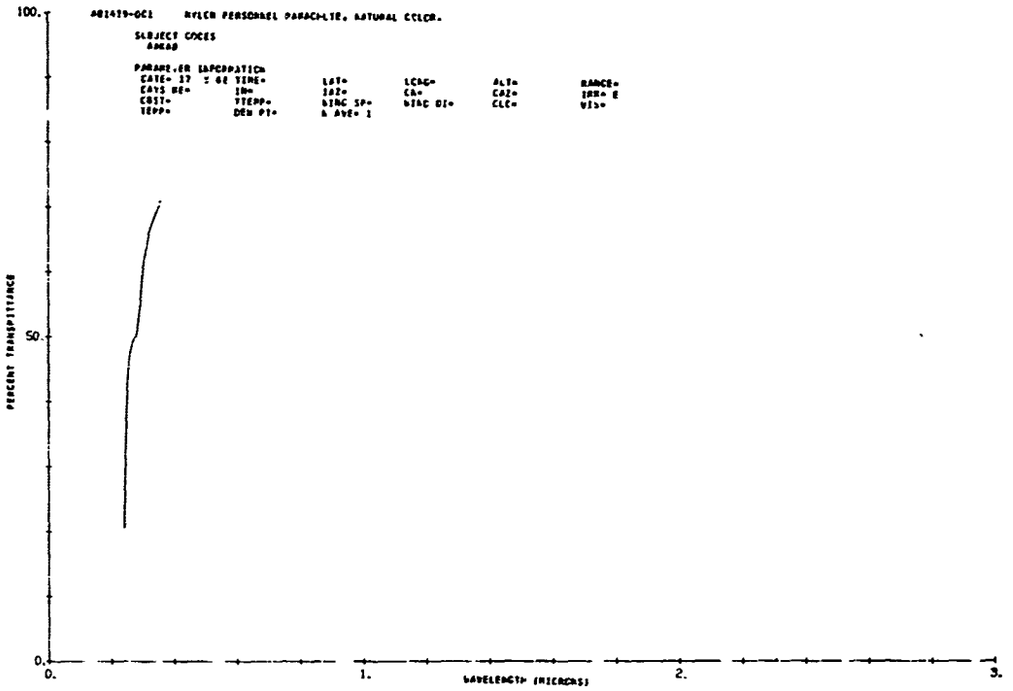

100.
50.
0.
0.
1.
2.
3.
PERCENT TRANSMITTANCE
WAVELENGTH (MICRONS)


100.
50.
0.
0.
1.
2.
3.
PERCENT TRANSMISSIONCE
WAVELENGTH (MICRONS)


100.
50.
0.
0.
1.
2.
PERCENT TRANSMISSIONCE
WAVELENGTH (MICRONS)


100.
50.
0.
0.
1.
2.
3.
PERCENT TRANSMITTANCE
WAVELENGTH (MICRONS)


100.
50.
0.
0.
1.
2.
3.
PERCENT TRANSMITTANCE
WAVELENGTH (MICRONS)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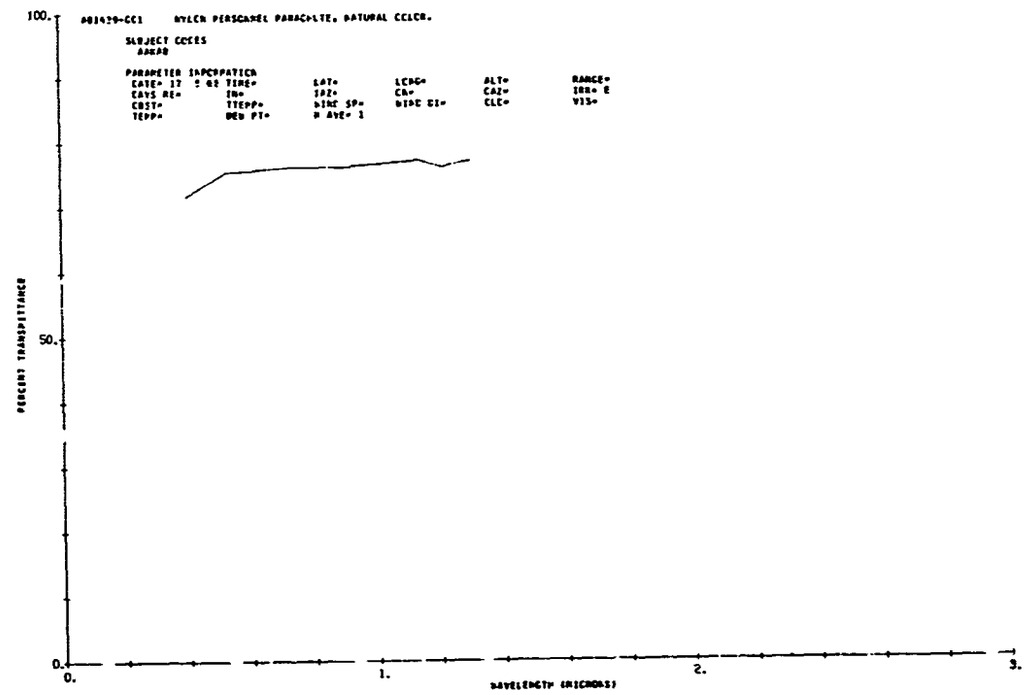
A01439-GC1 NYLON PERSONAL PARACHUTE, NATURAL CONDR.
SUBJECT CODES
AAKAB
PARAMETER INFORMATION
CATE= 17 = GE TIME=
CAYS RE= IN=
CONST= TTEMP=
TEMP= DEW PT=
LAT=
IAZ=
WIND SP=
AVE= 1
LONG=
CA=
WIND DI=
ALT=
CAZ=
CLC=
RANGE=
IRR= E
VIS=
PERCENT TRANSMITTANCE
50.
0.
0.
1.
2.
3.
WAVELENGTH (MICRONS)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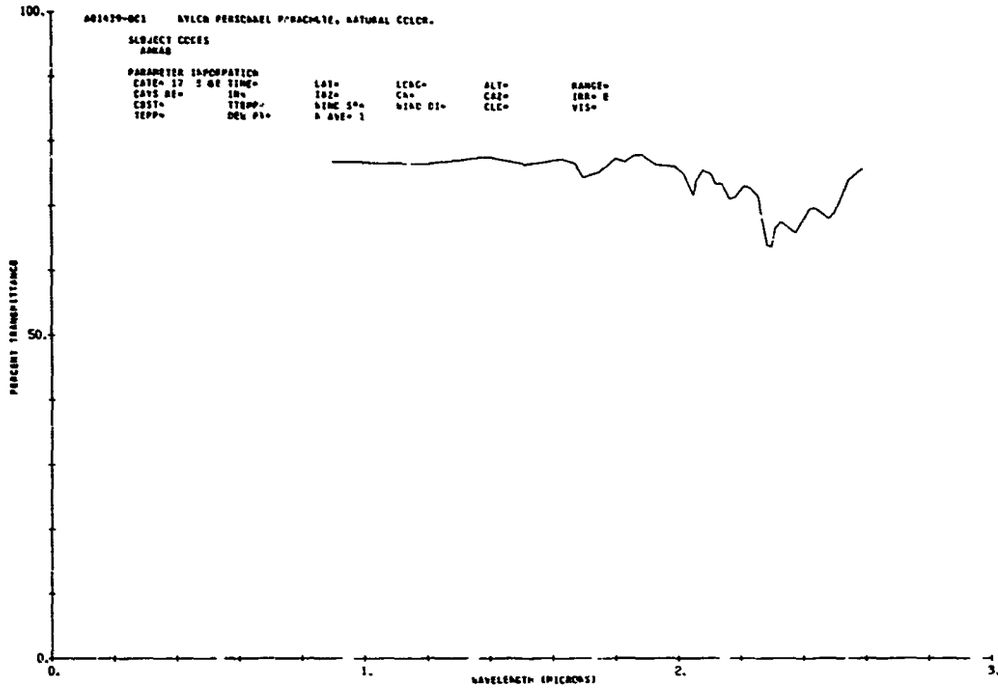
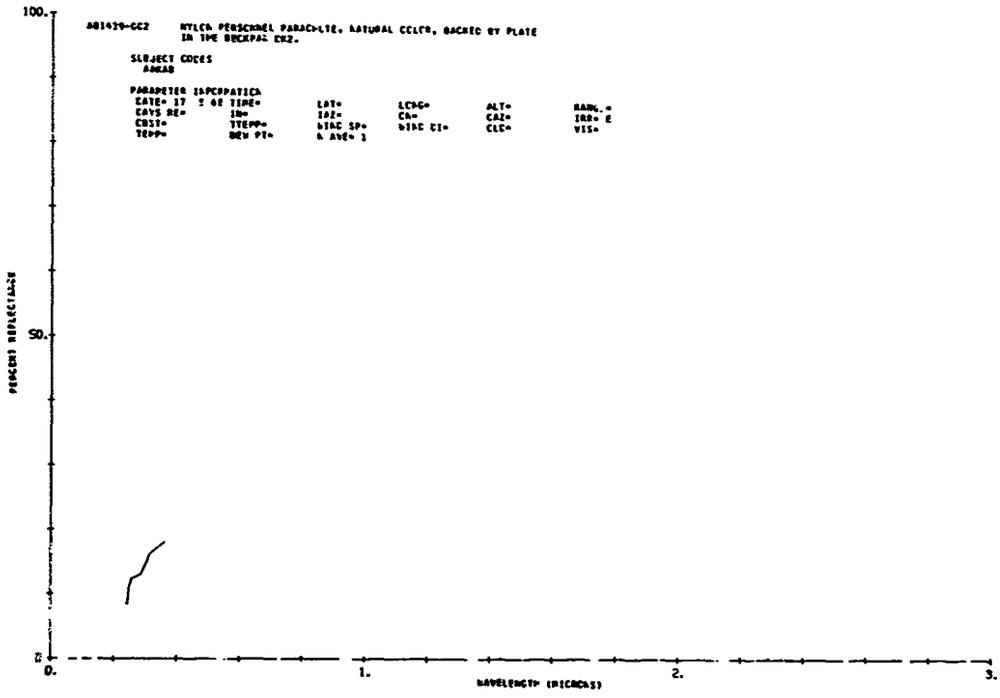
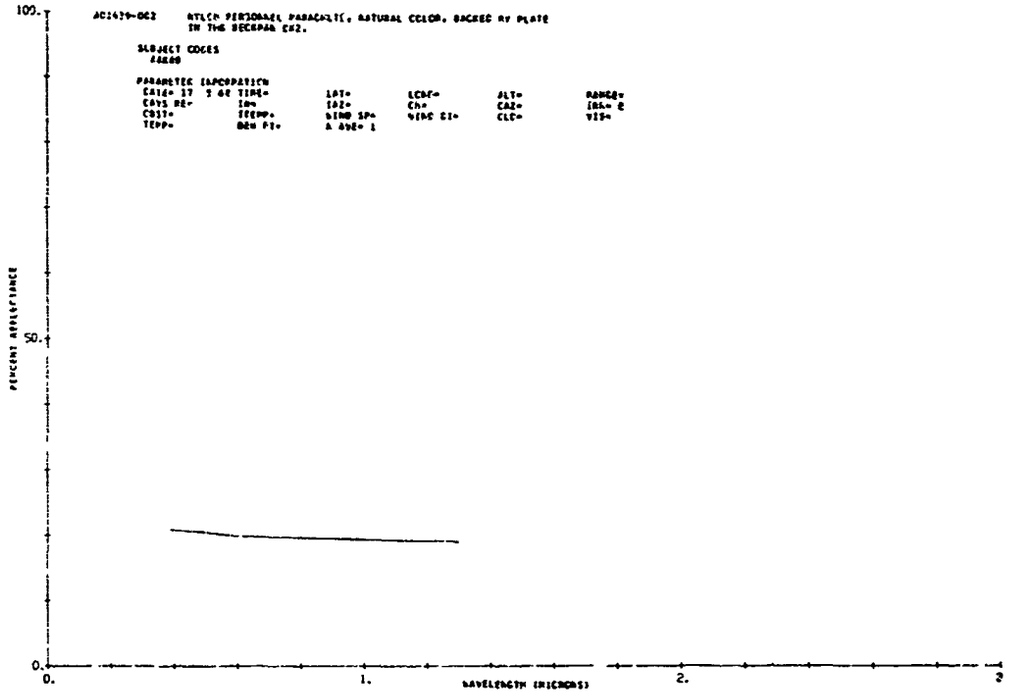
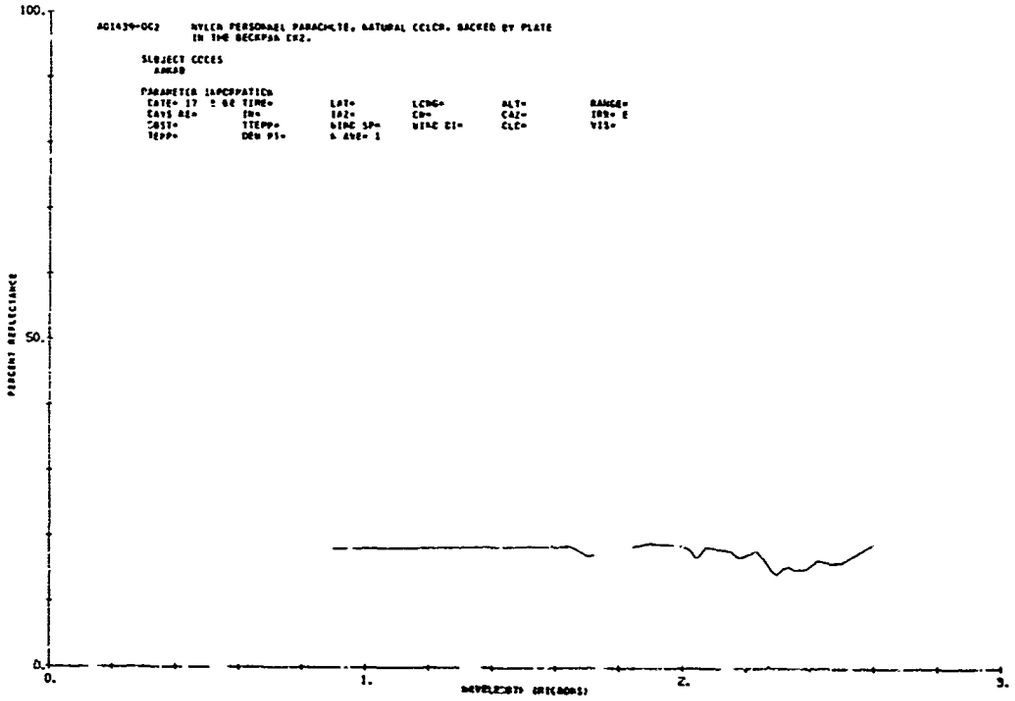
A01439-GC1 NYLON PERSONAL PARACHUTE, NATURAL CONDR.
SUBJECT CODES
AAKAB
PARAMETER INFORMATION
CATE= 17 = GE TIME=
CAYS RE= IN=
CONST= TTEMP=
TEMP= DEW PT=
LAT=
IAZ=
WIND SP=
AVE= 1
LONG=
CA=
WIND DI=
ALT=
CAZ=
CLC=
RANGE=
IRR= E
VIS=
PERCENT TRANSMITTANCE
50.
0.
0.
1.
2.
3.
WAVELENGTH (MICRONS)


A81429-0C1 NYLON PERSONNEL PARACHUTE, NATURAL COLOR.
SUBJECT CODES
AAKAB
PARAMETER INFORMATION
DATE= 17 T OF TIME=
DAYS RE= IN=
OBST= TTEMP=
TEMP= DEW PT=
LAT= LONG= ALT= RANGE=
IAZ= CA= CAZ= IRR= E
WIND SP= WIND DI= CLD= VIS=
A AVE= 1
PERCENT TRANSMITTANCE
100.
50.
0.
0.
1.
2.
3.
WAVELENGTH (MICRONS)

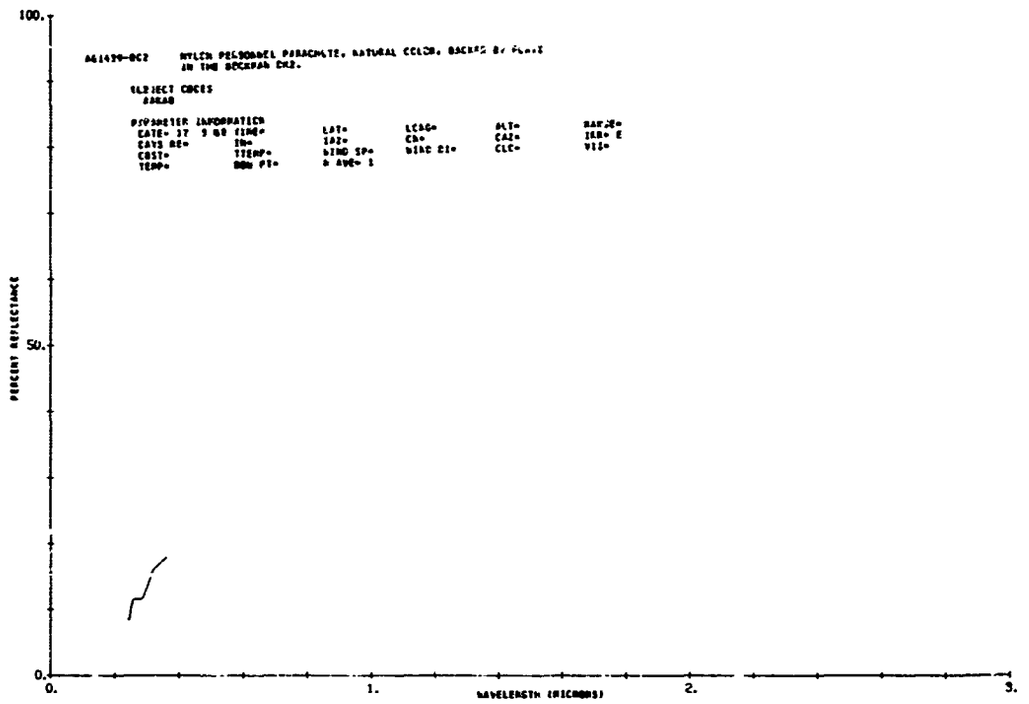

A81429-0C2 NYLON PERSONNEL PARACHUTE, NATURAL COLOR, BACKED BY PLATE IN THE BECKMAN EX2.
SUBJECT CODES
AAKAB
PARAMETER INFORMATION
DATE= 17 T OF TIME=
DAYS RE= IN=
OBST= TTEMP=
TEMP= DEW PT=
LAT= LONG= ALT= RANGE=
IAZ= CA= CAZ= IRR= E
WIND SP= WIND DI= CLD= VIS=
A AVE= 1
PERCENT REFLECTANCE
100.
50.
0.
0.
1.
2.
3.
WAVELENGTH (MICRONS)

AAKA 63





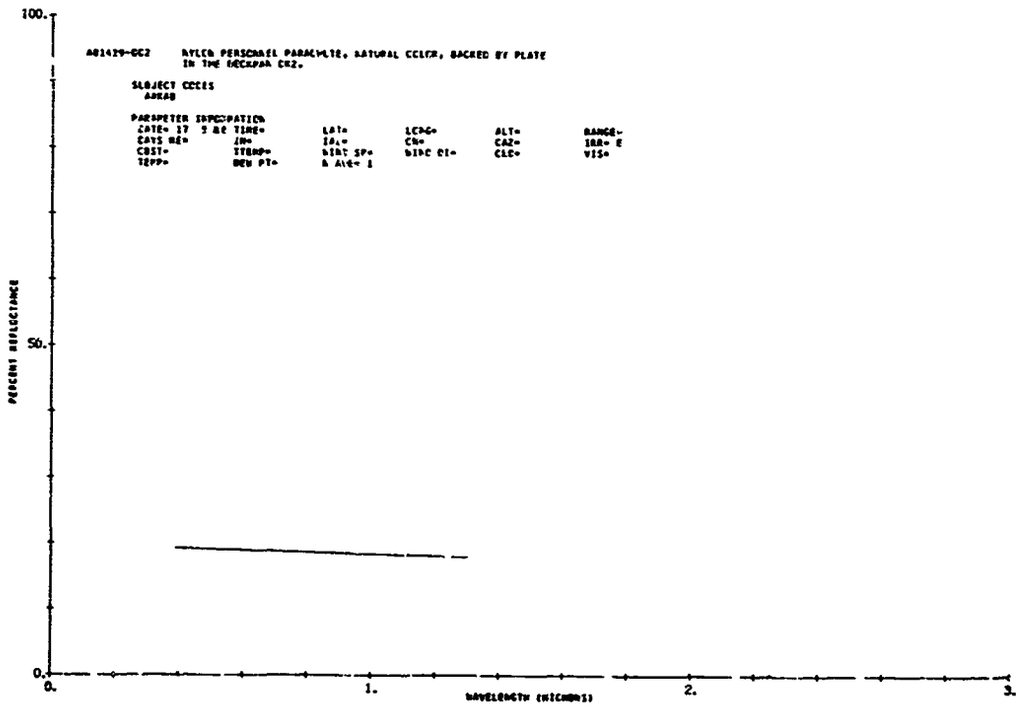
July 1966



A61429-0C2 NYLON PERSONNEL PARACHUTE, NATURAL COLOR, BACKED BY PLATE
IN THE DECKPAN CH2.

SUBJECT CODES
ARAB

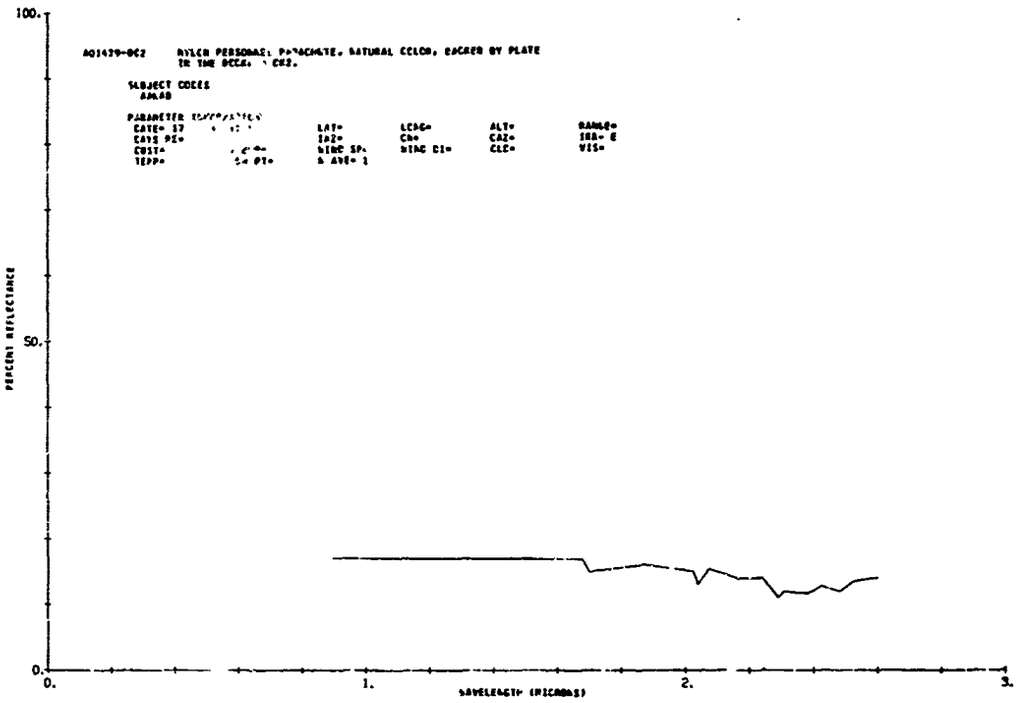
PARAMETER INFORMATION
DATE= 17 7 66 TIME= LAT= LONG= ALT= RANGE=
DAYS BE= IN= IAZ= CH= CAZ= IRR= E
COST= ITEMP= WIND SP= WIND DI= CLC= VIS=
TEMP= DEW PT= A AVG= I

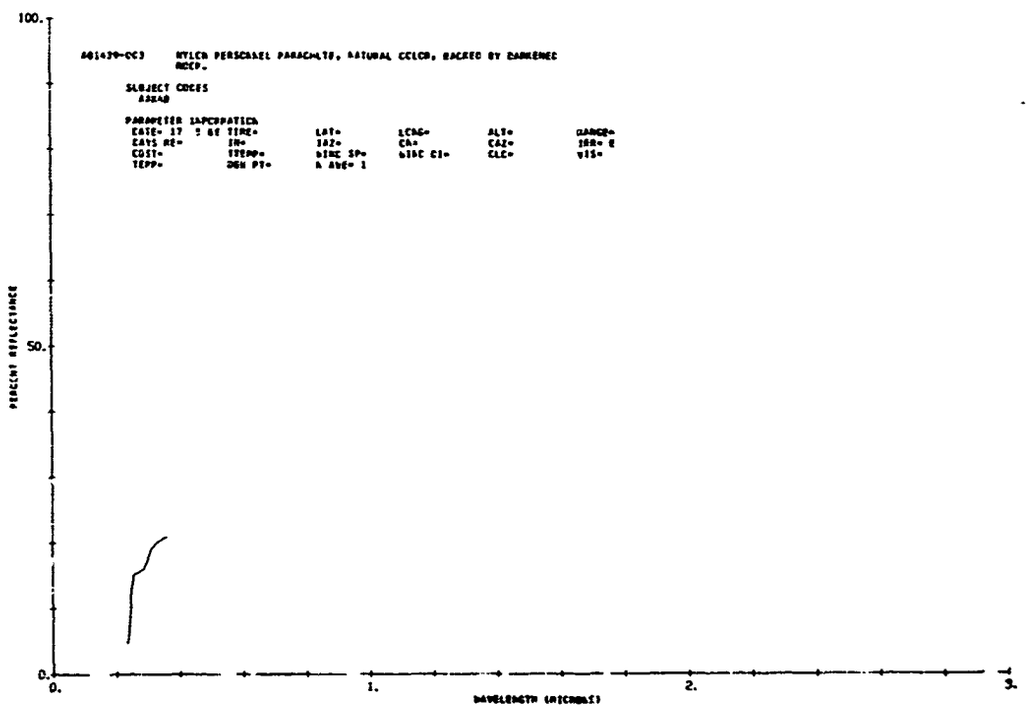


A61429-0C2 NYLON PERSONNEL PARACHUTE, NATURAL COLOR, BACKED BY PLATE
IN THE DECKPAN CH2.

SUBJECT CODES
ARAB

PARAMETER INFORMATION
DATE= 17 7 66 TIME= LAT= LONG= ALT= RANGE=
DAYS BE= IN= IAZ= CH= CAZ= IRR= E
COST= ITEMP= WIND SP= WIND DI= CLC= VIS=
TEMP= DEW PT= A AVG= I


A01439-0C2 NYLON PERSONNEL PARACHUTE, NATURAL COLOR, BACKED BY PLATE
IN THE DOCK, [illegible] CK2.
SUBJECT CODES
AAKAB
PARAMETER INFORMATION
DATE= 17
DAYS RE=
COST=
TEMP=
LAT=
IAZ=
WIND SP=
N AVE= 1
LONG=
CN=
WIND DI=
ALT=
CAZ=
CLC=
RANGE=
IRR= E
VIS=
PERCENT REFLECTANCE
100.
50.
0.
0.
1.
2.
3.
WAVELENGTH (MICRONS)


A01439-0C3 NYLON PERSONNEL PARACHUTE, NATURAL COLOR, BACKED BY DARKENED
ROCK.
SUBJECT CODES
AAKAB
PARAMETER INFORMATION
DATE= 17 [illegible] TIME=
DAYS RE=
COST=
TEMP=
LAT=
IAZ=
WIND SP=
N AVE= 1
LONG=
CN=
WIND DI=
ALT=
CAZ=
CLC=
RANGE=
IRR= E
VIS=
PERCENT REFLECTANCE
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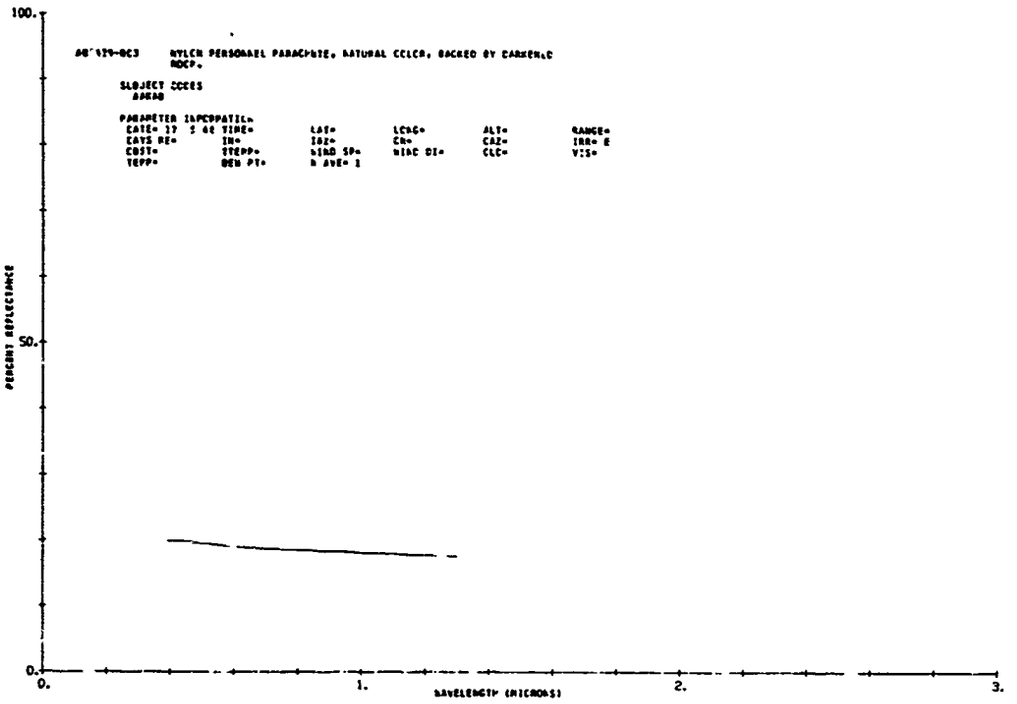
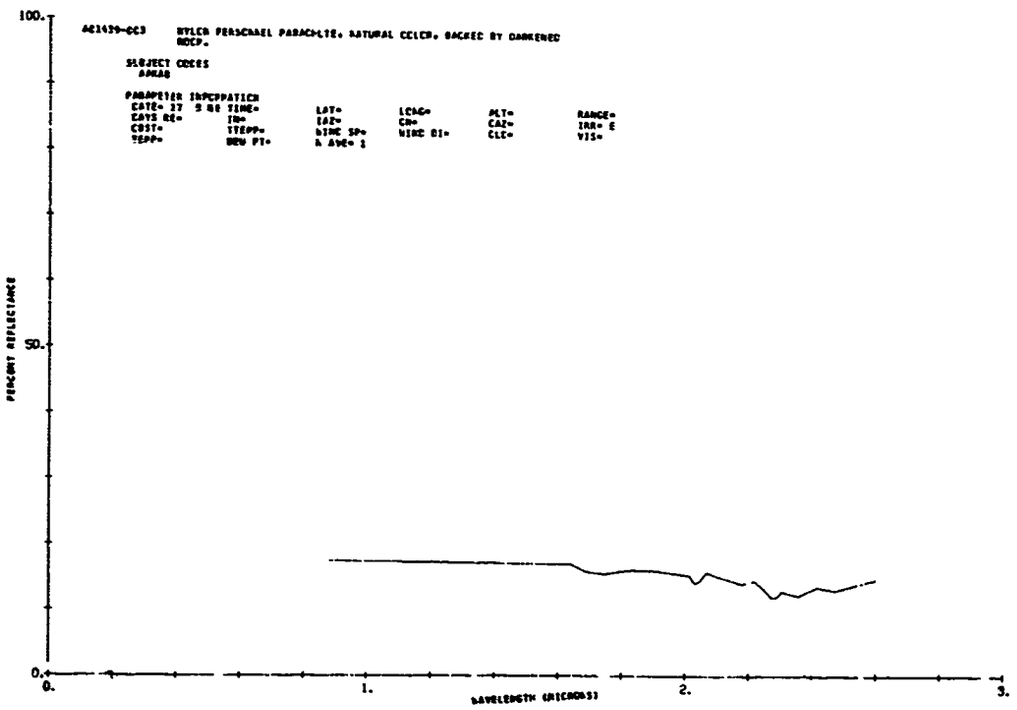
50.
0.
0.
1.
2.
3.
WAVELENGTH (MICRONS)



AE1439-0C3 NYLON PERSONNEL PARACHUTE, NATURAL COLOR, BACKED BY CAMOUFLAGE RIPSTOP.

SUBJECT CODES
AAKAB

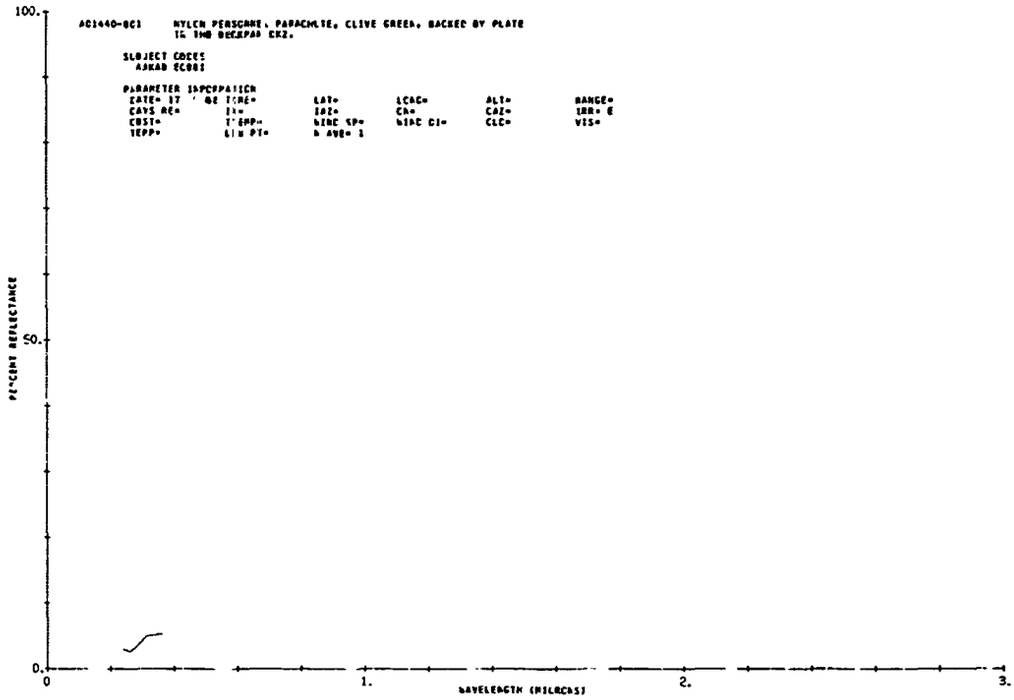
PARAMETER INFORMATION
CATE= 17 S AE TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= IAZ= CN= CAZ= IRR= E
COST= TEMP= WIND SP= WIND DI= CLE= VIS=
TEMP= DEW PT= H AVE= I

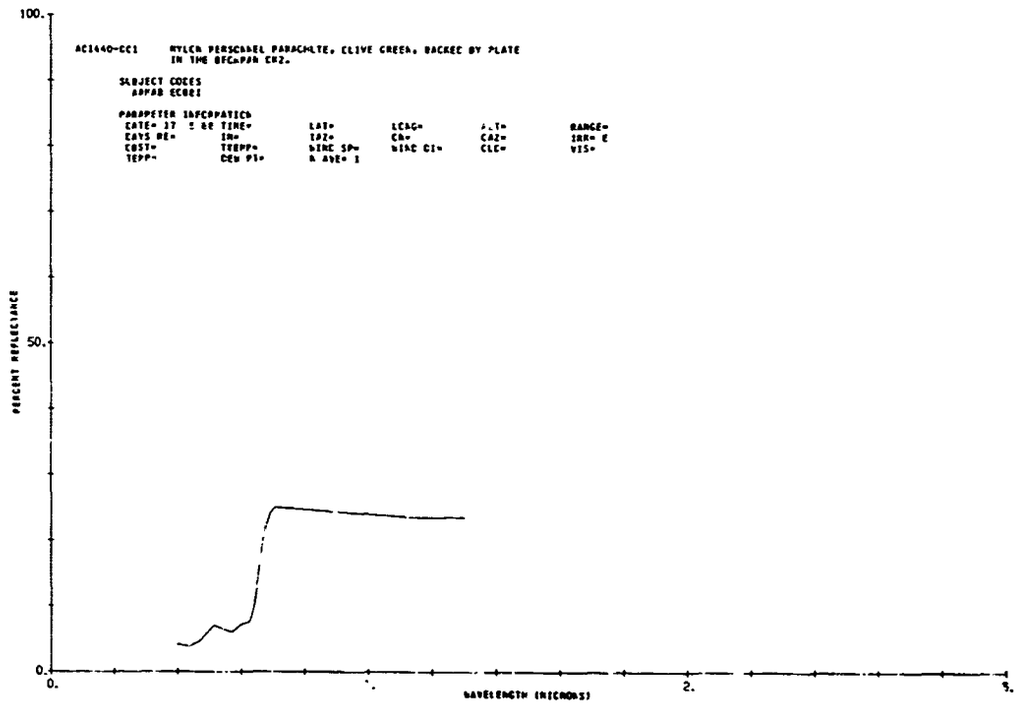


AE1439-0C3 NYLON PERSONNEL PARACHUTE, NATURAL COLOR, BACKED BY CAMOUFLAGE RIPSTOP.

SUBJECT CODES
AAKAB

PARAMETER INFORMATION
CATE= 17 S AE TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= IAZ= CN= CAZ= IRR= E
COST= TEMP= WIND SP= WIND DI= CLE= VIS=
TEMP= DEW PT= H AVE= I


AC1440-0C1 NYLON PERSONNEL PARACHUTE, OLIVE GREEN, BACKED BY PLATE
IN THE BECKMAN CK2.
SUBJECT CODES
AAKAB EC001
PARAMETER INFORMATION
DATE= 17 ' 82 TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= IAZ= CN= CAZ= IRR= E
COST= TEMP= WIND SP= WIND DI= CLC= VIS=
TEPP= DEW PT= N AVE= 1
PERCENT REFLECTANCE
100.
50.
0.
0
1.
2.
3.
WAVELENGTH (MICRONS)


AC1440-0C1 NYLON PERSONNEL PARACHUTE, OLIVE GREEN, BACKED BY PLATE
IN THE BECKMAN CK2.
SUBJECT CODES
AAKAB EC001
PARAMETER INFORMATION
DATE= 17 ' 82 TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= IAZ= CN= CAZ= IRR= E
COST= TEMP= WIND SP= WIND DI= CLC= VIS=
TEPP= DEW PT= N AVE= 1
PERCENT REFLECTANCE
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0.
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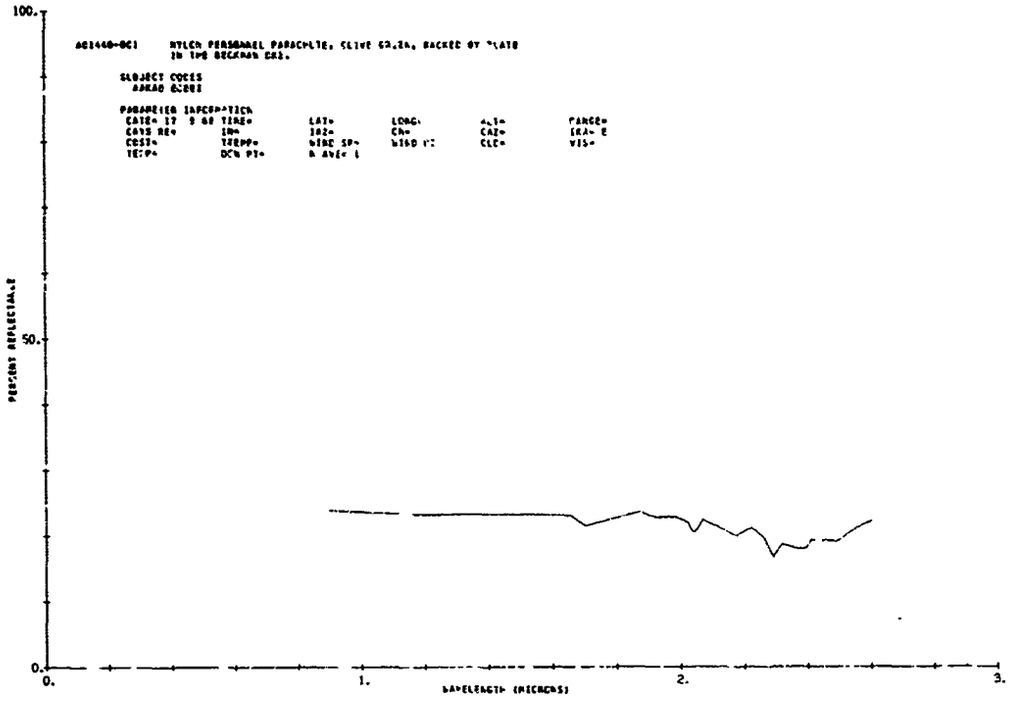
2.
WAVELENGTH (MICRONS)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PERCENT REFLECTANCE
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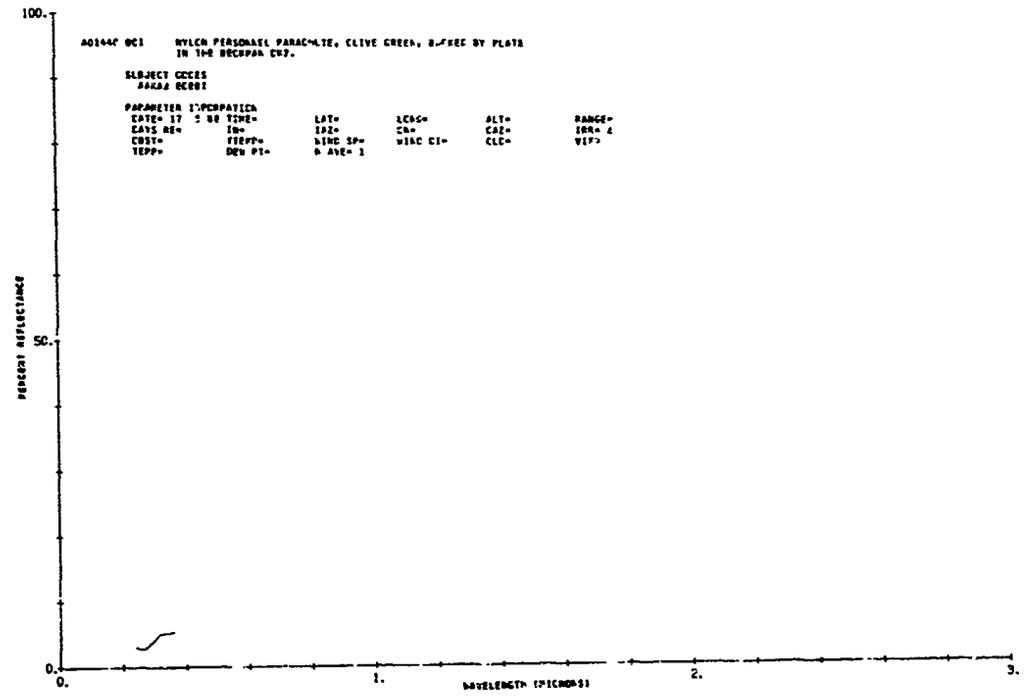
1.
2.
3.
WAVELENGTH (MICRONS)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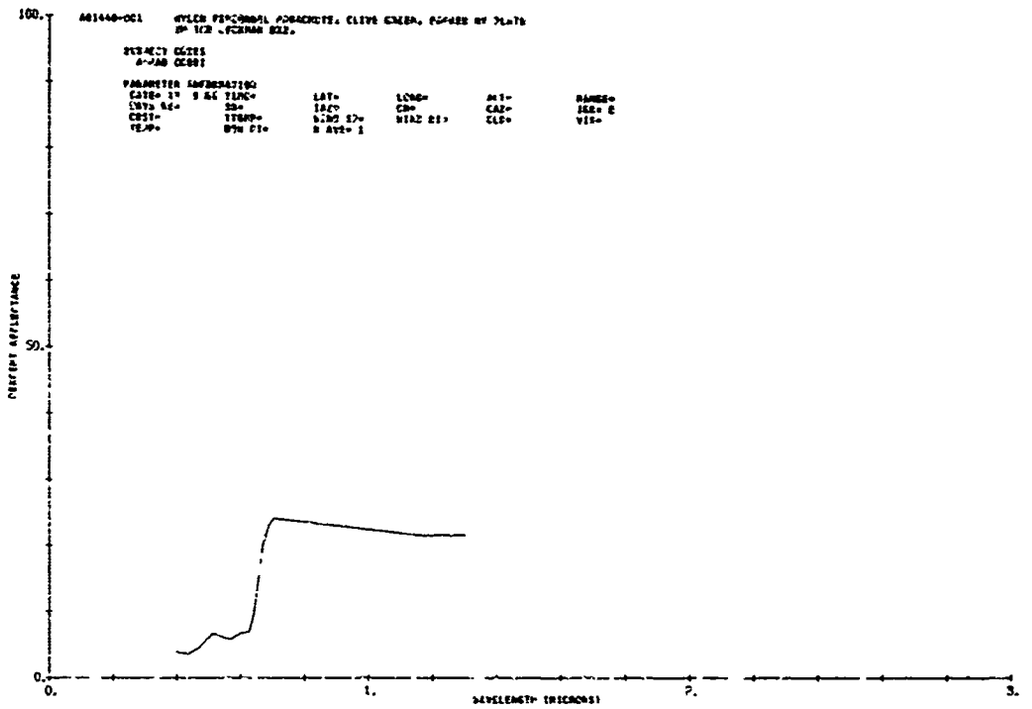
PERCENT REFLECTANCE
0.
1.
2.
3.
WAVELENGTH (MICRONS)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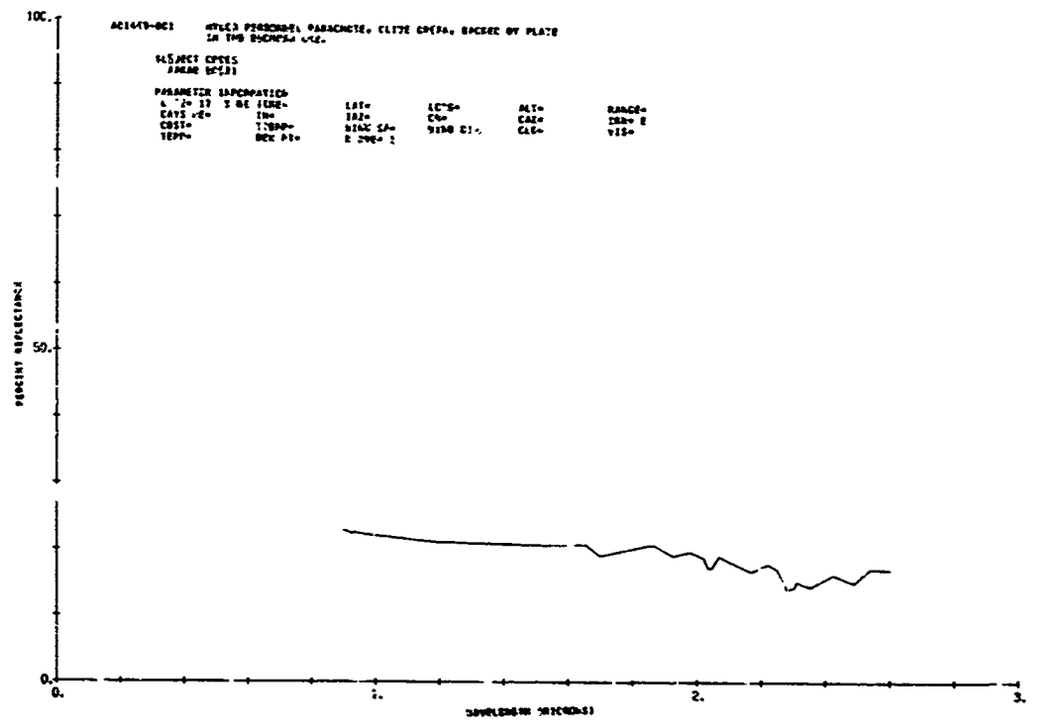
1.
2.
3.
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)


100.
50.
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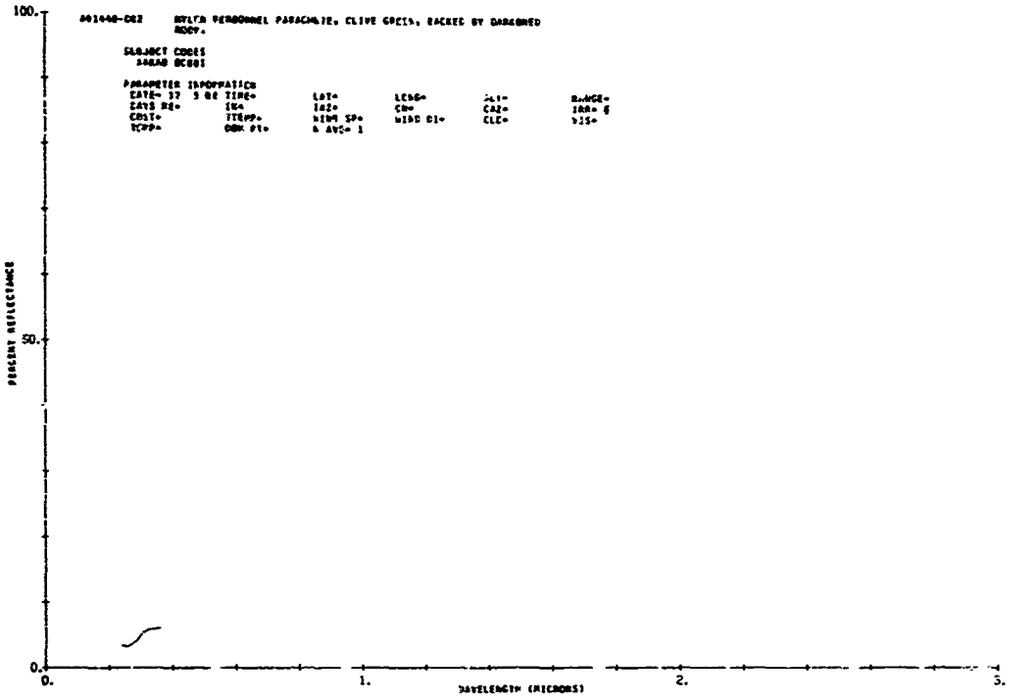
1.
2.
3.
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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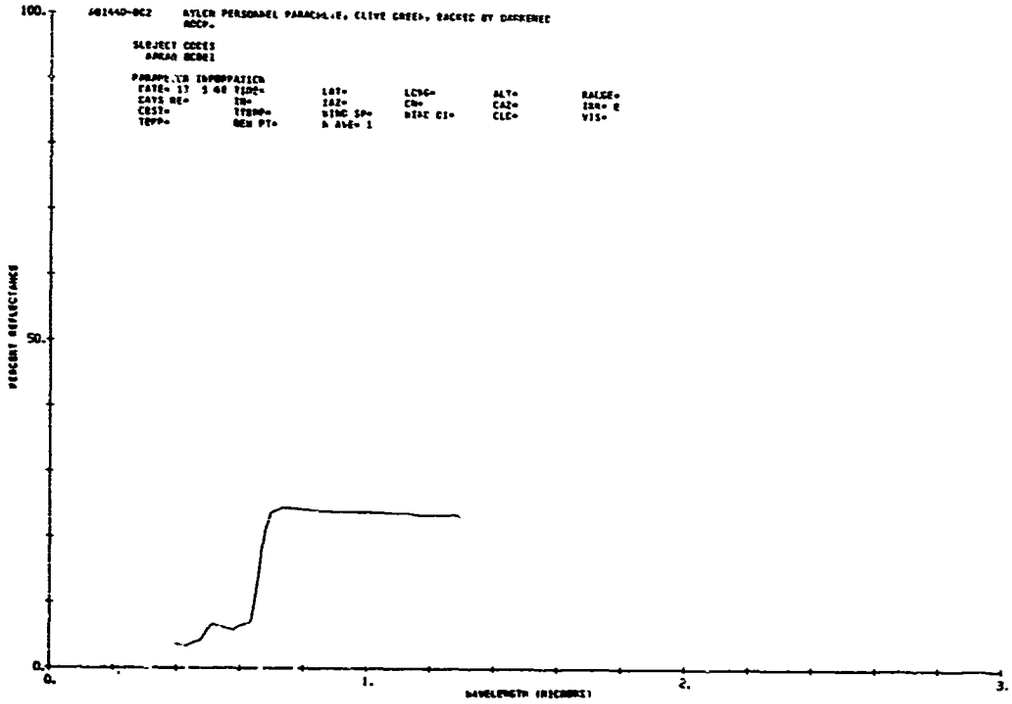
0.
1.
2.
3.
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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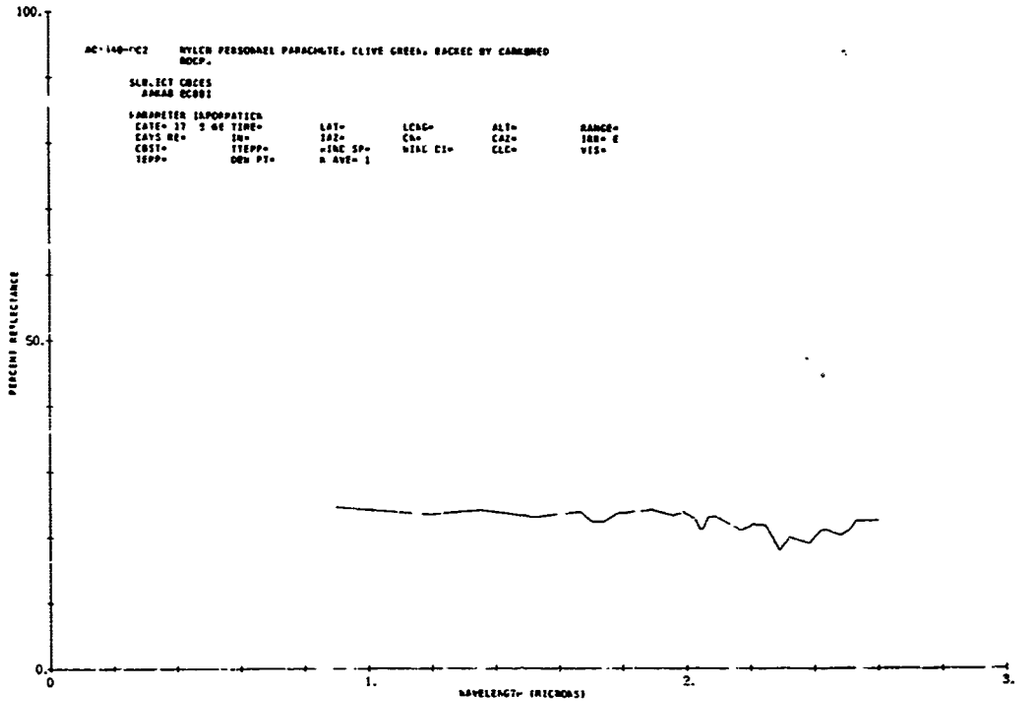
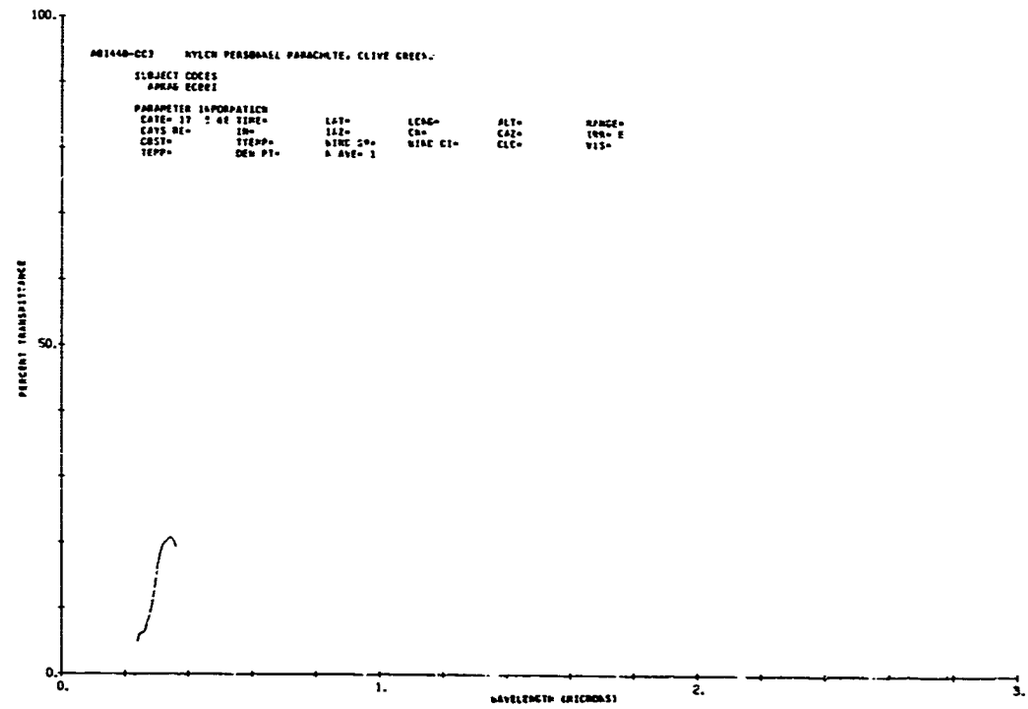
0.
1.
2.
3.
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)



AC-140-CC2 NYLON PERSONNEL PARACHUTE, OLIVE GREEN, BACKED BY CAMOUFLAGED ROCP.

SUBJECT CODES
AMEAS ECOOI

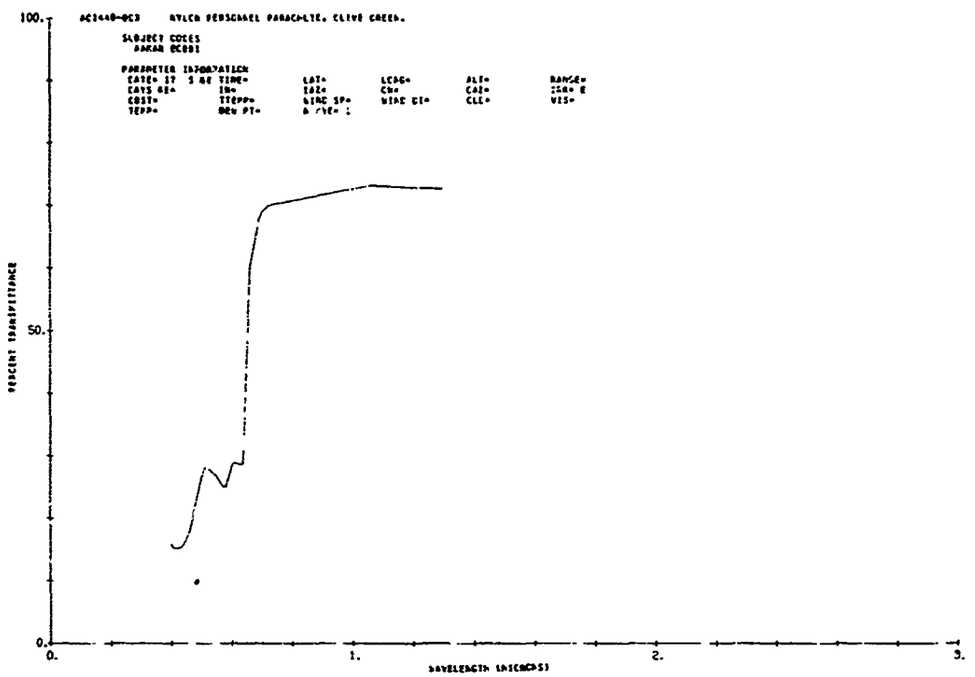
PARAMETER INFORMATION
DATE= 17 2 66 TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= IAZ= CN= CAZ= IRR= E
CBST= TTEMP= SIRC SP= SIRC DI= CLC= VIS=
TEMP= DEW PT= A AVE= 1



AR1440-CC3 NYLON PERSONNEL PARACHUTE, OLIVE GREEN.

SUBJECT CODES
AMEAS ECOOI

PARAMETER INFORMATION
DATE= 17 2 66 TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= IAZ= CN= CAZ= IRR= E
CBST= TTEMP= SIRC SP= SIRC DI= CLC= VIS=
TEMP= DEW PT= A AVE= 1


AC1440-0C3 NYLON PERSONNEL PARACHUTE, CLIVE GREEN.
SUBJECT CODES
PARAMETER INFORMATION
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50.
0.
PERCENT TRANSMITTANCE
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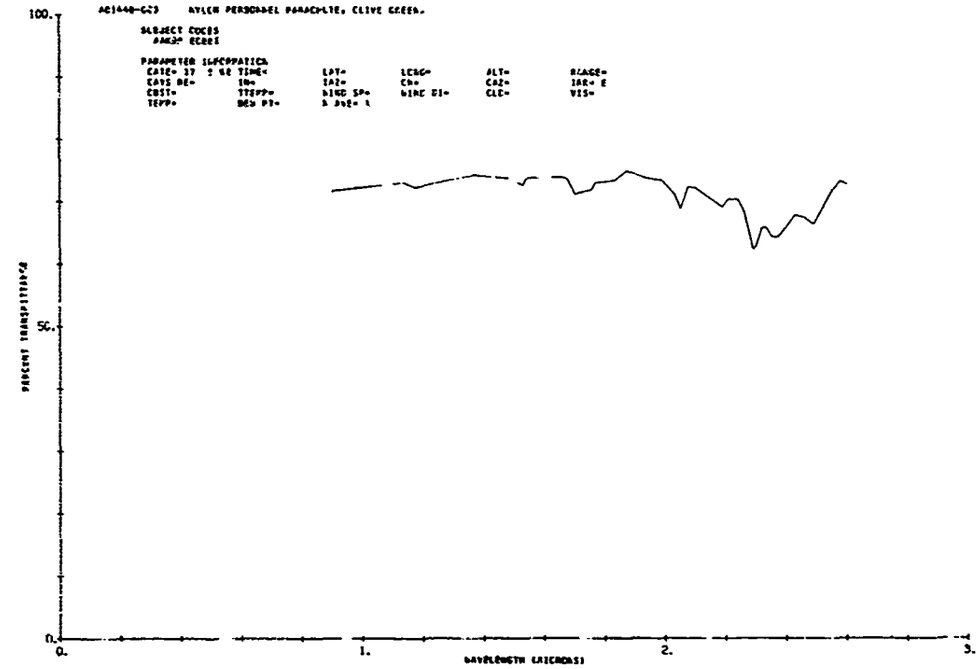
1.
2.
3.
WAVELENGTH (MICRONS)


AC1440-0C3 NYLON PERSONNEL PARACHUTE, CLIVE GREEN.
SUBJECT CODES
PARAMETER INFORMATION
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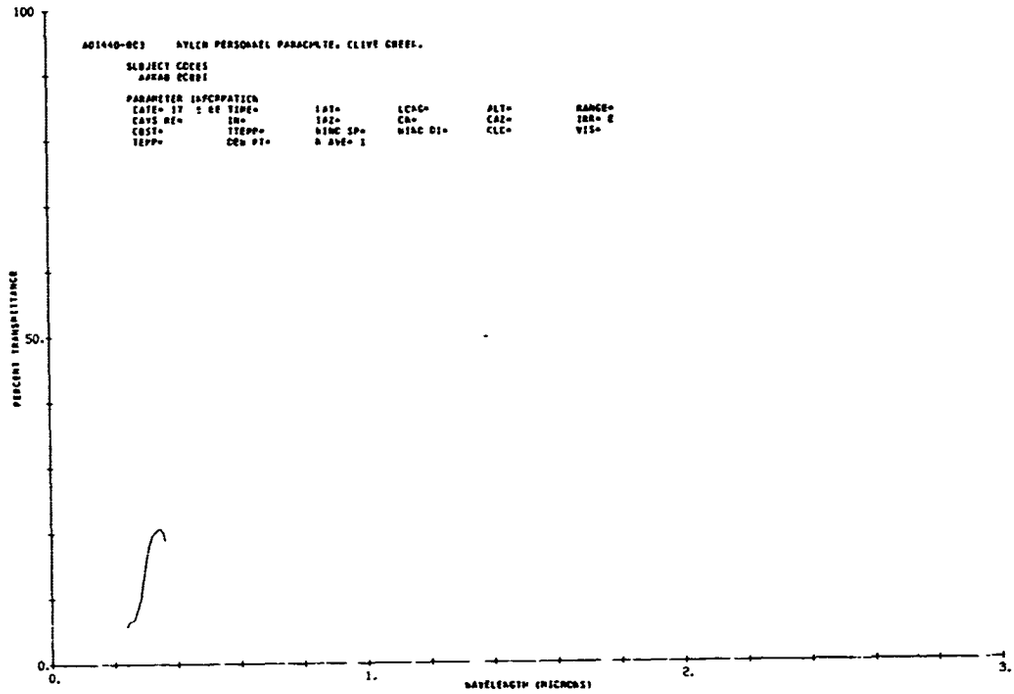
50.
0.
PERCENT TRANSMITTANCE
0.
1.
2.
3.
WAVELENGTH (MICRONS)


100
50.
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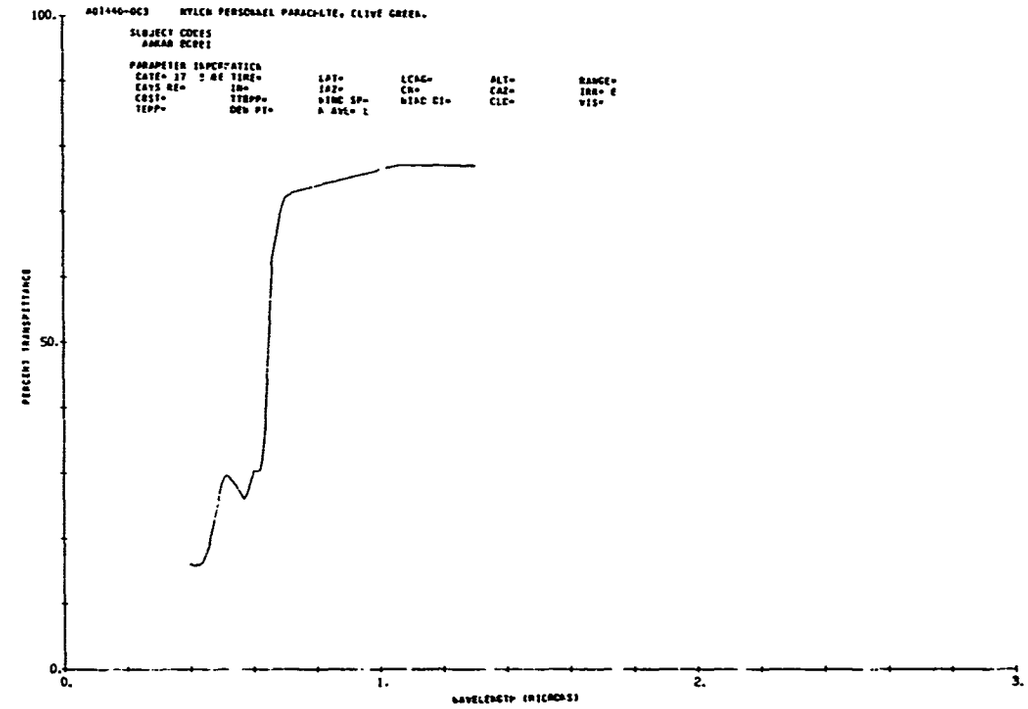
0.
1.
2.
3.
PERCENT TRANSMITTANCE
WAVELENGTH (MICRONS)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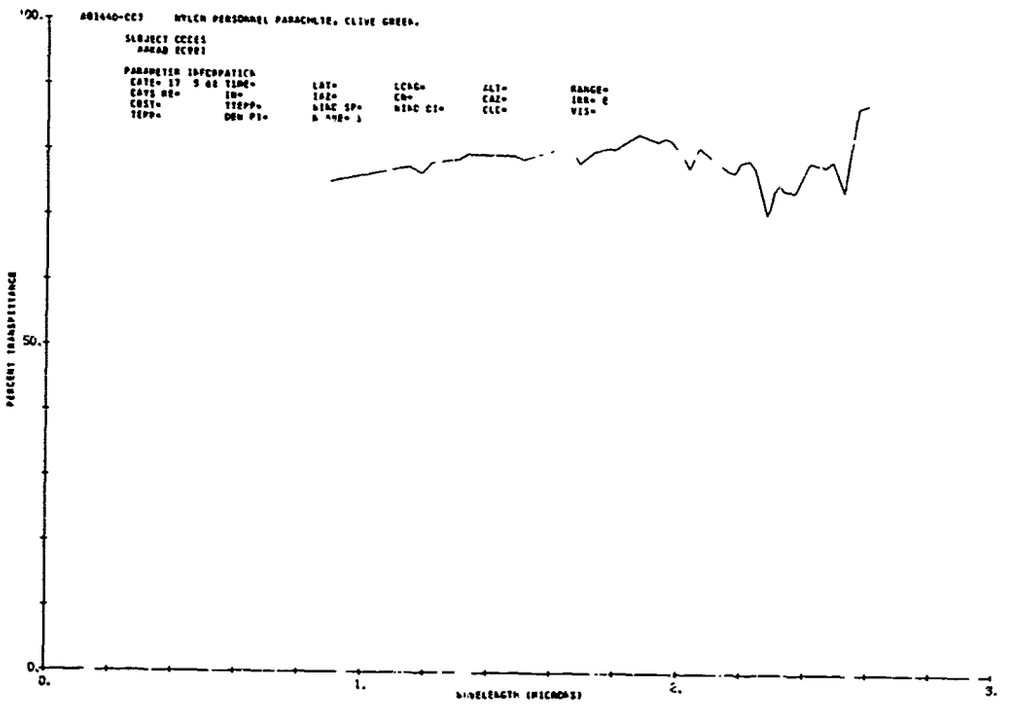
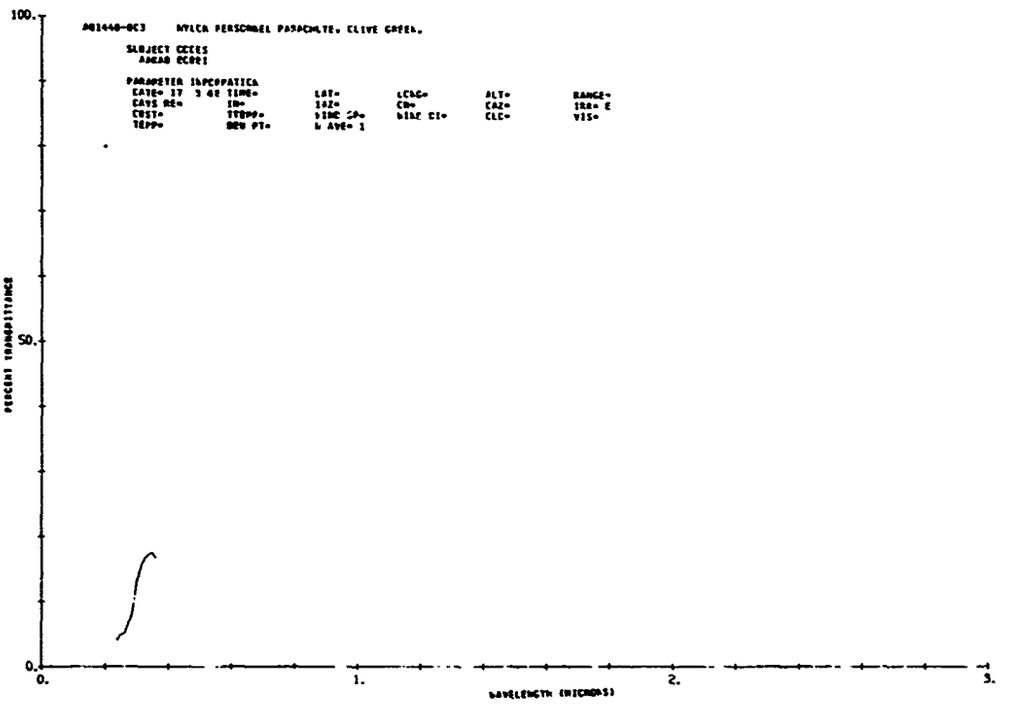
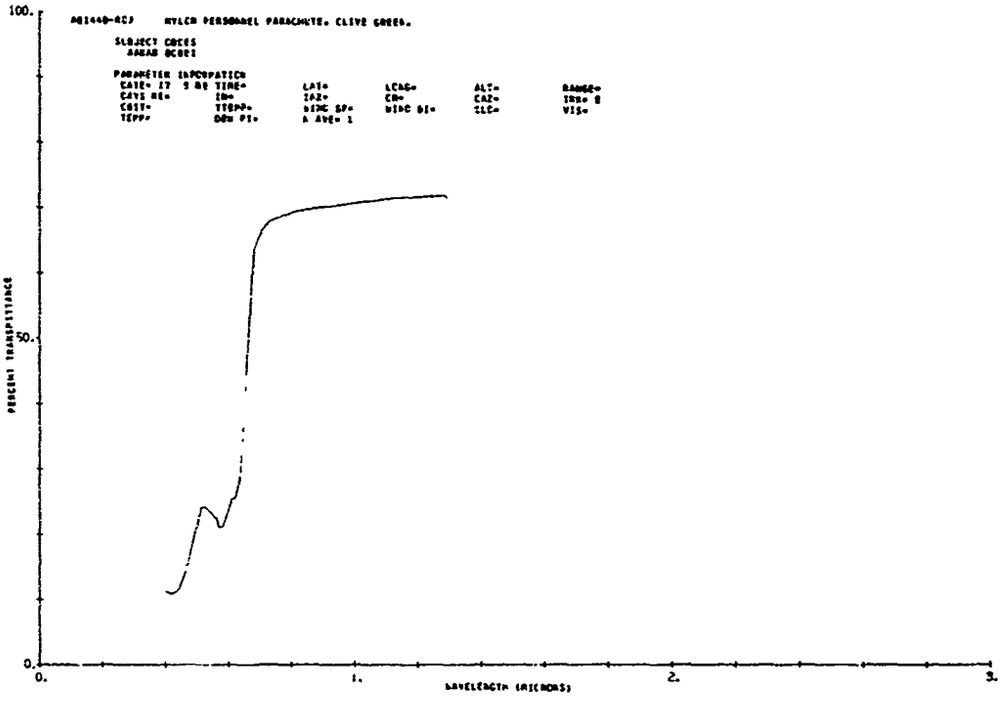
2.
3.
PERCENT TRANSMITTANCE
WAVELENGTH (MICRONS)


A01440-CC3 NYLON PERSONNEL PARACHUTE, OLIVE GREEN.
SUBJECT CCCES
AAKAB ECRBI
PARAMETER INFORMATION
CATE= 17 3 48 TIME= LAT= LONG= ALT= RANGE=
CAYS RE= IN= IAZ= CN= CAZ= IRR= E
CUST= TTEMP= WIND SP= WIND DI= CLC= VIS=
TEMP= DEW PT= N AVE= 1
PERCENT TRANSMITTANCE
100.
50.
0.
0.
1.
2.
3.
WAVELENGTH (MICRONS)


A01440-BC3 NYLON PERSONNEL PARACHUTE, OLIVE GREEN.
SUBJECT CCCES
AAKAB ECRBI
PARAMETER INFORMATION
CATE= 17 3 48 TIME= LAT= LONG= ALT= RANGE=
CAYS RE= IN= IAZ= CN= CAZ= IRR= E
CUST= TTEMP= WIND SP= WIND DI= CLC= VIS=
TEMP= DEW PT= N AVE= 1
PERCENT TRANSMITTANCE
100.
50.
0.
0.
1.
2.
3.
WAVELENGTH (MICRONS)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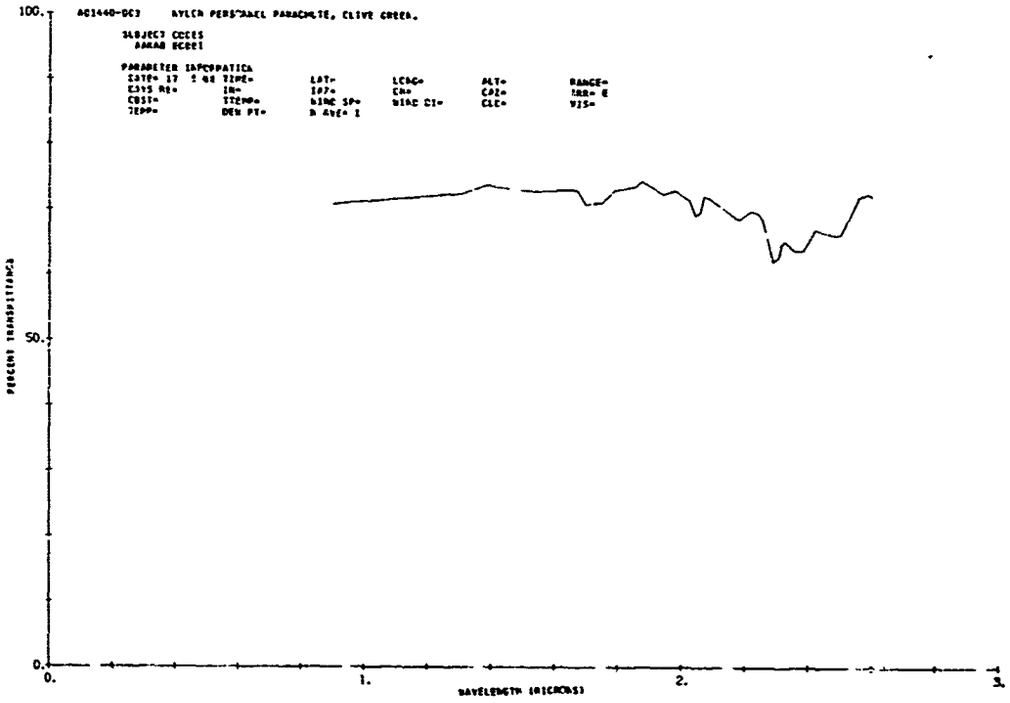
1.
2.
3.
PERCENT TRANSMITTANCE
WAVELENGTH (MICRONS)


100.
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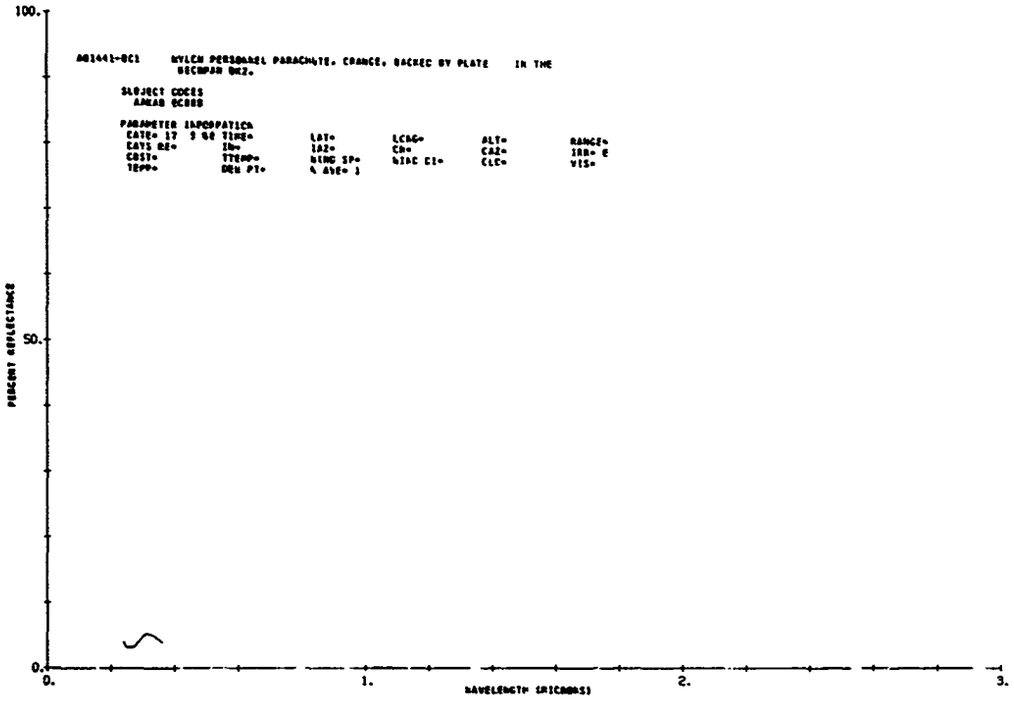
0.
1.
2.
3.
PERCENT TRANSMITTANCE
WAVELENGTH (MICRONS)


100.
50.
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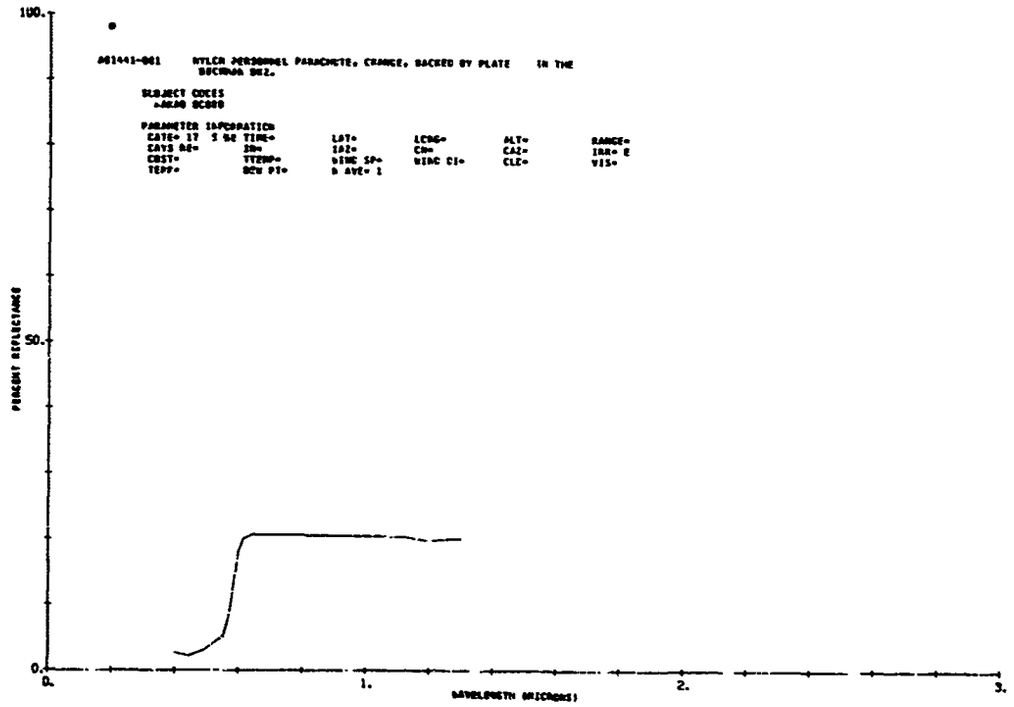
0.
1.
2.
3.
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)
A01441-0C1 NYLON PERSONNEL PARACHUTE, CHANGE, BACKED BY PLATE IN THE
SUBJECT CODES
PARAMETER INFORMATION


100.
50.
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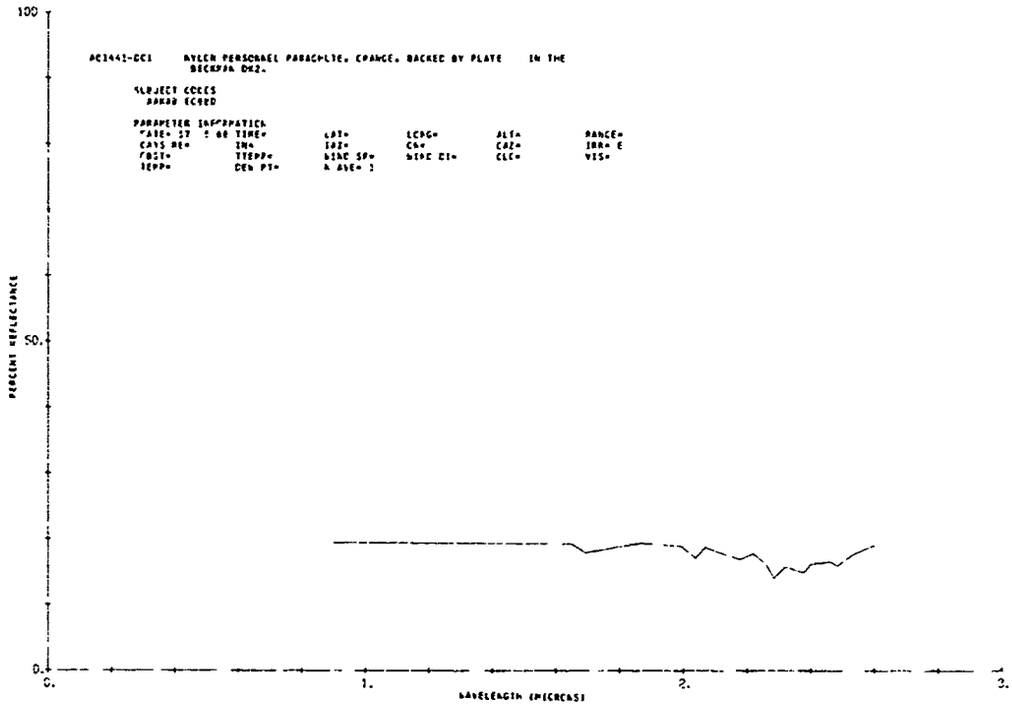
0.
1.
2.
3.
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)
A01441-001 NYLON PERSONNEL PARACHUTE, CHANGE, BACKED BY PLATE IN THE
SUBJECT CODES
PARAMETER INFORMATION


AC1441-CC1 NYLON PERSONNEL PARACHUTE, ORANGE, BACKED BY PLATE IN THE BECKMAN DK2.
SUBJECT CODES
AAKAB ECBBD
PARAMETER INFORMATION
DATE= 17 5 68 TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= TAZ= CN= CAZ= IRR= E
COST= TTEMP= WIND SP= WIND DI= CLC= VIS=
TEMP= DEW PT= N AVE= 1
PERCENT REFLECTANCE
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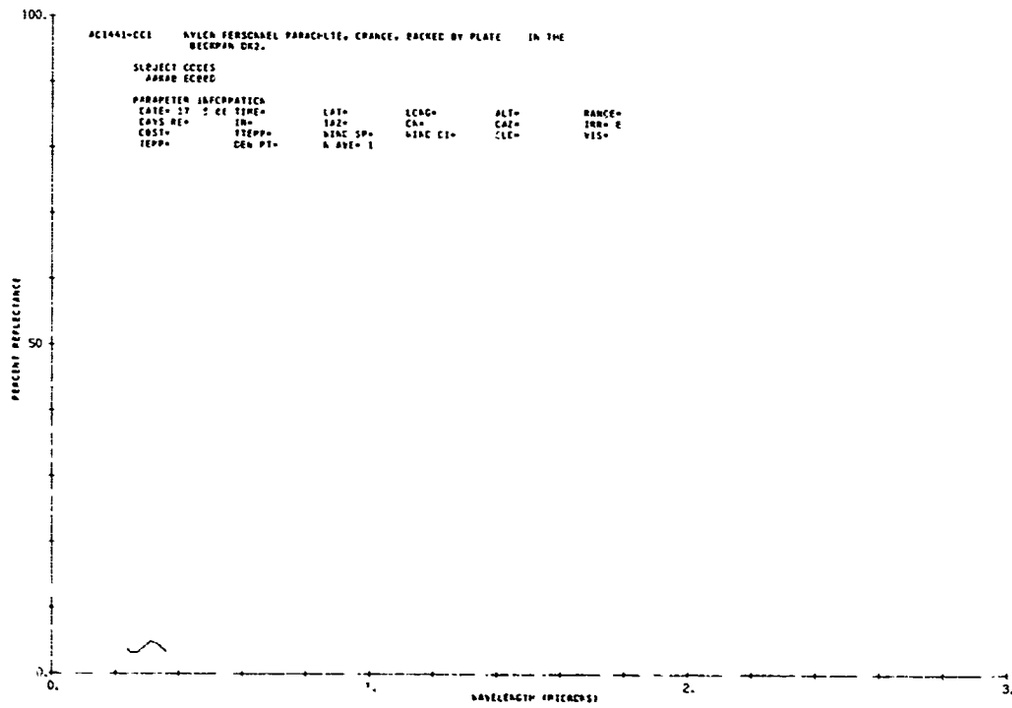
WAVELENGTH (MICRONS)


AC1441-CC1 NYLON PERSONNEL PARACHUTE, ORANGE, BACKED BY PLATE IN THE BECKMAN DK2.
SUBJECT CODES
AAKAB ECBBD
PARAMETER INFORMATION
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DAYS RE= IN= TAZ= CN= CAZ= IRR= E
COST= TTEMP= WIND SP= WIND DI= CLC= VIS=
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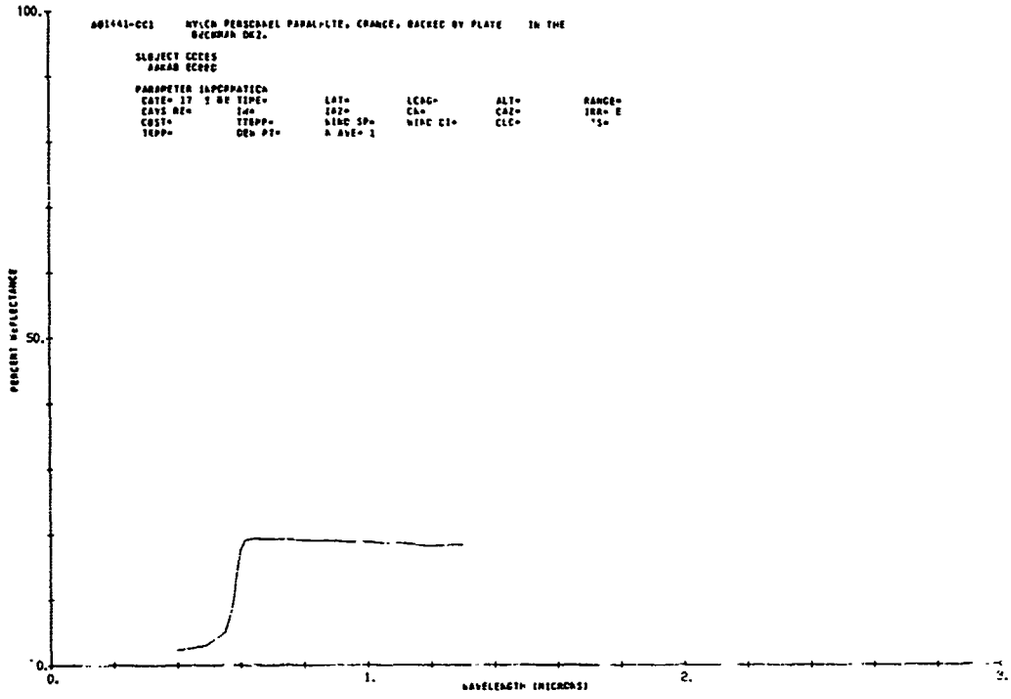
WAVELENGTH (MICRONS)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BOCKMAN DK2.
SUBJECT CODES
AAKAB ECBBC
PARAMETER INFORMATION
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DAYS RE= IN= IAZ= CN= CAZ= IRR= E
COST= TTEMP= WIND SP= WIND DI= CLC= VIS=
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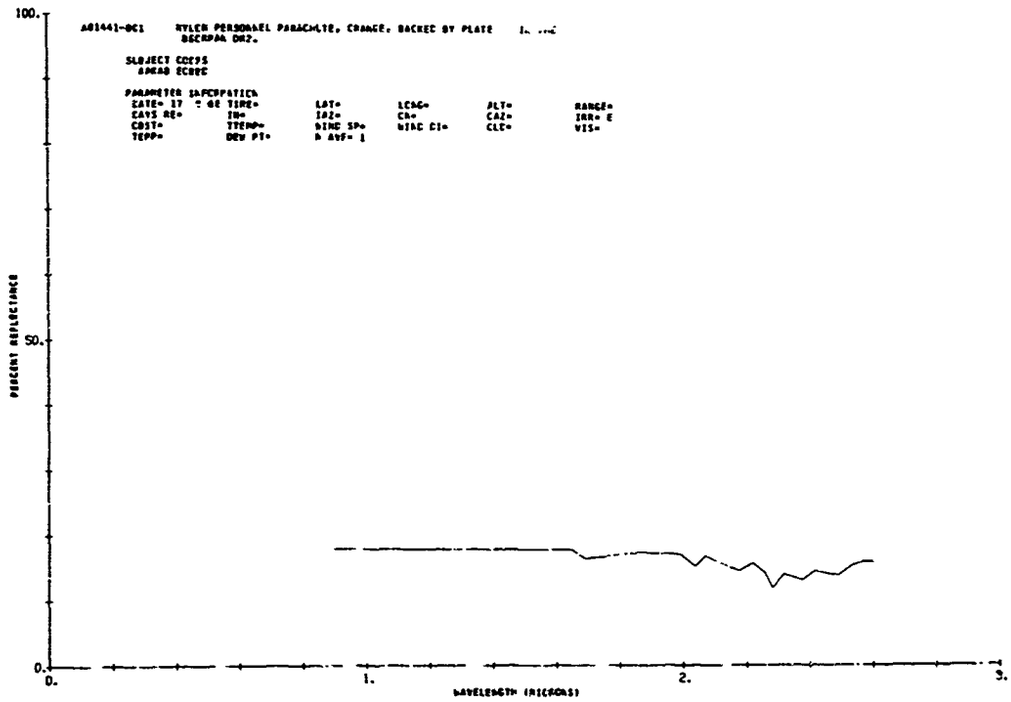
WAVELENGTH (MICRONS)


A01441-0C1 NYLON PERSONNEL PARACHUTE, ORANGE, BACKED BY PLATE
BOCKMAN DK2.
SUBJECT CODES
AAKAB ECBBC
PARAMETER INFORMATION
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DAYS RE= IN= IAZ= CN= CAZ= IRR= E
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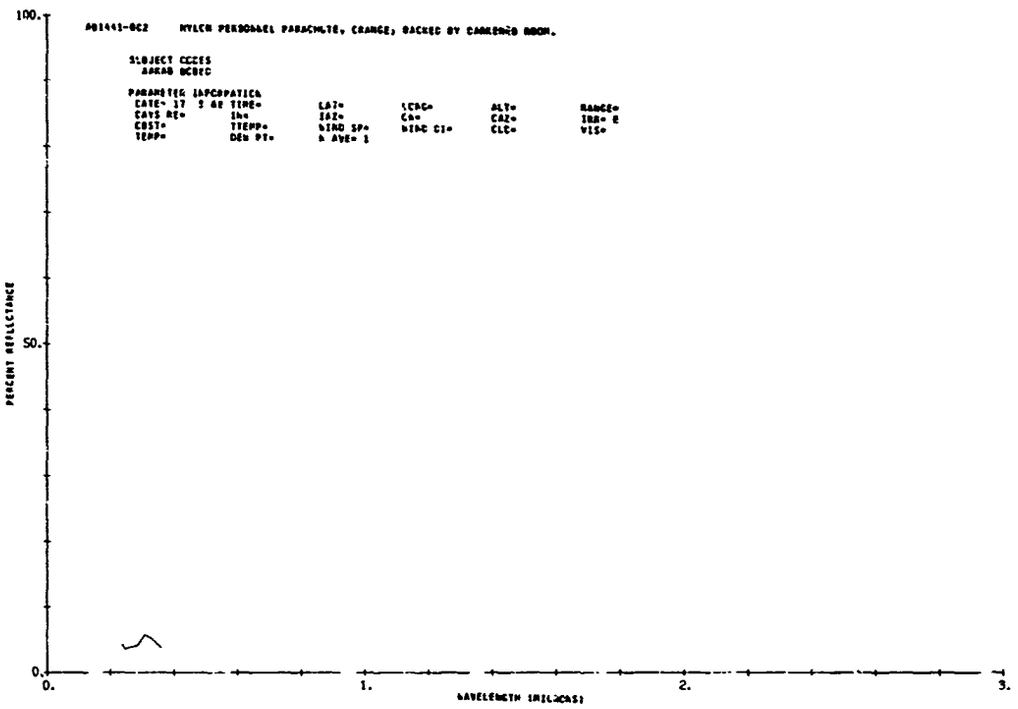
WAVELENGTH (MICRONS)


AB1441-0C2 NYLON PERSONNEL PARACHUTE, ORANGE, BACKED BY DARKENED ROOM.
SUBJECT CODES
AAKAB BCBED
PARAMETER INFORMATION
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DAYS RE= IN= IAZ= CN= CAZ= IRR= E
CBST= TTEMP= WIND SP= WIND DI= CLD= VIS=
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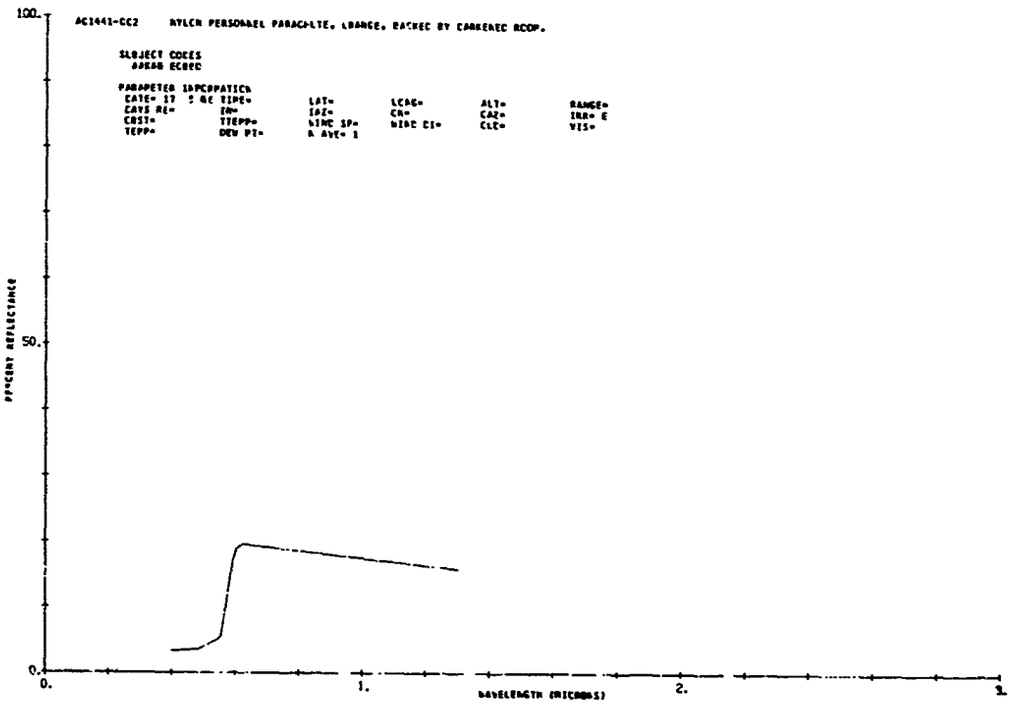
WAVELENGTH (MICRONS)


AC1441-0C2 NYLON PERSONNEL PARACHUTE, ORANGE, BACKED BY DARKENED ROOM.
SUBJECT CODES
AAKAB ECBED
PARAMETER INFORMATION
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DAYS RE= IN= IAZ= CN= CAZ= IRR= E
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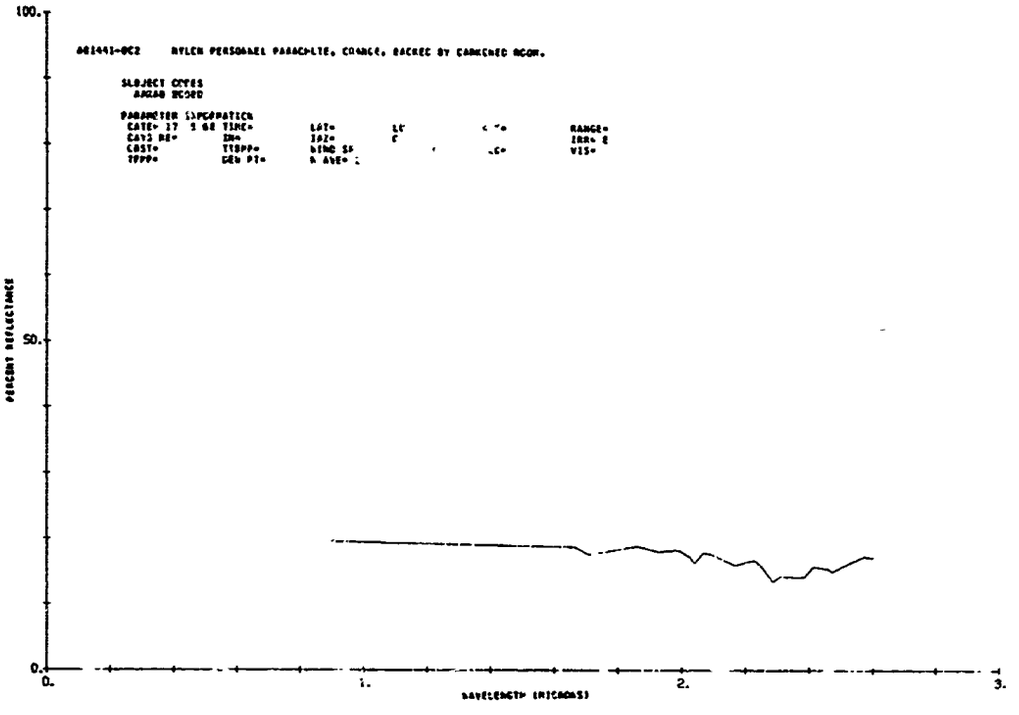
WAVELENGTH (MICRONS)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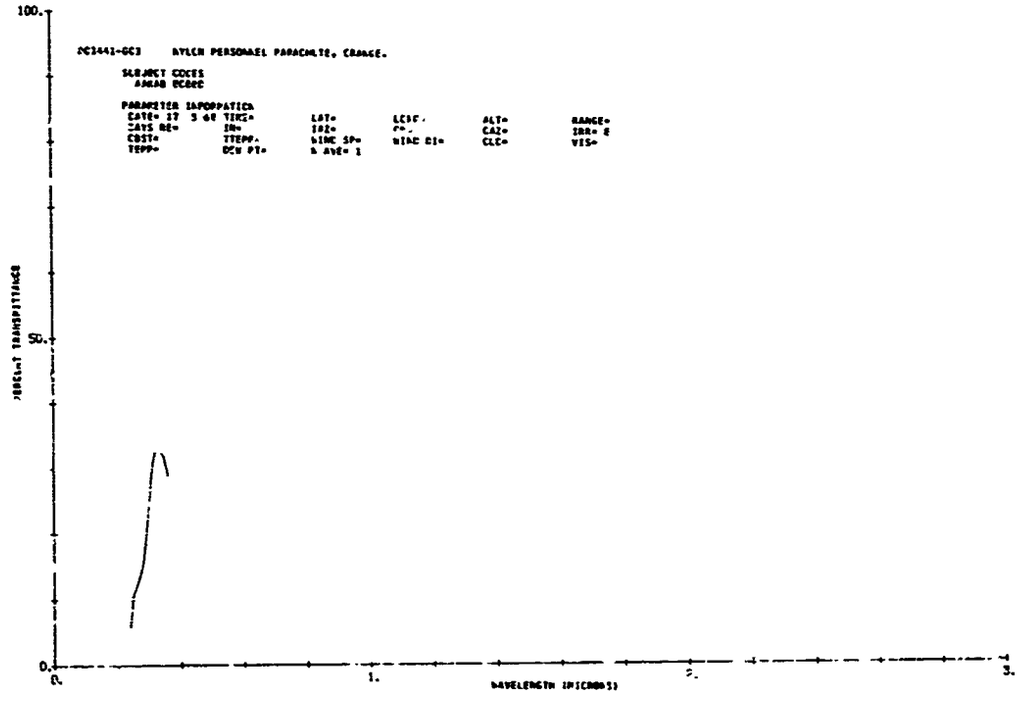
WAVELENGTH (MICRONS)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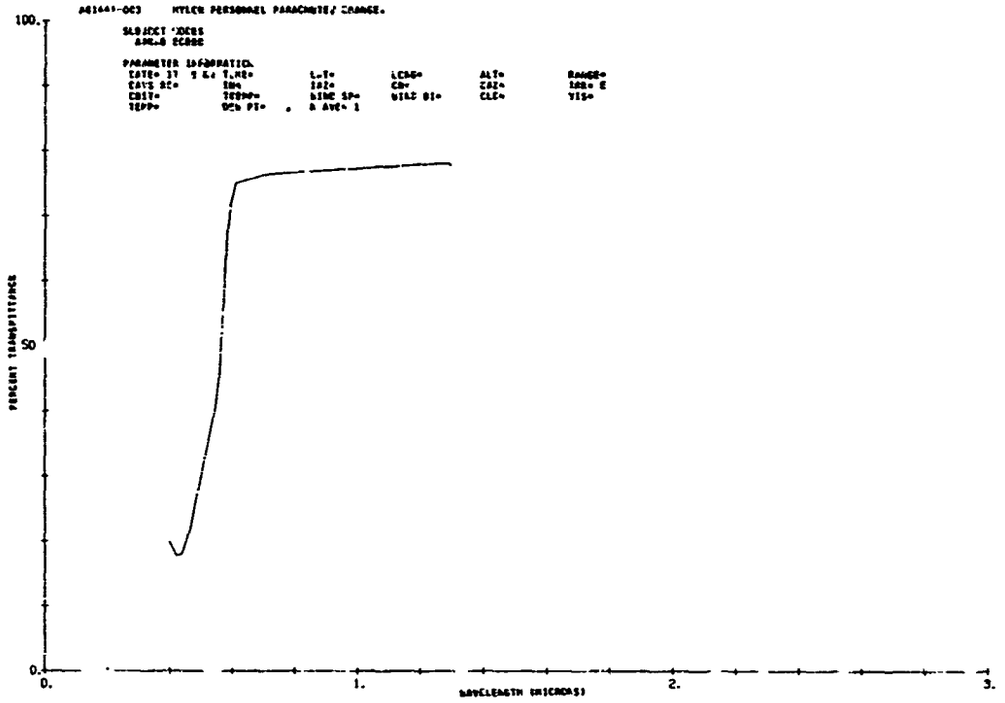
WAVELENGTH (MICRONS)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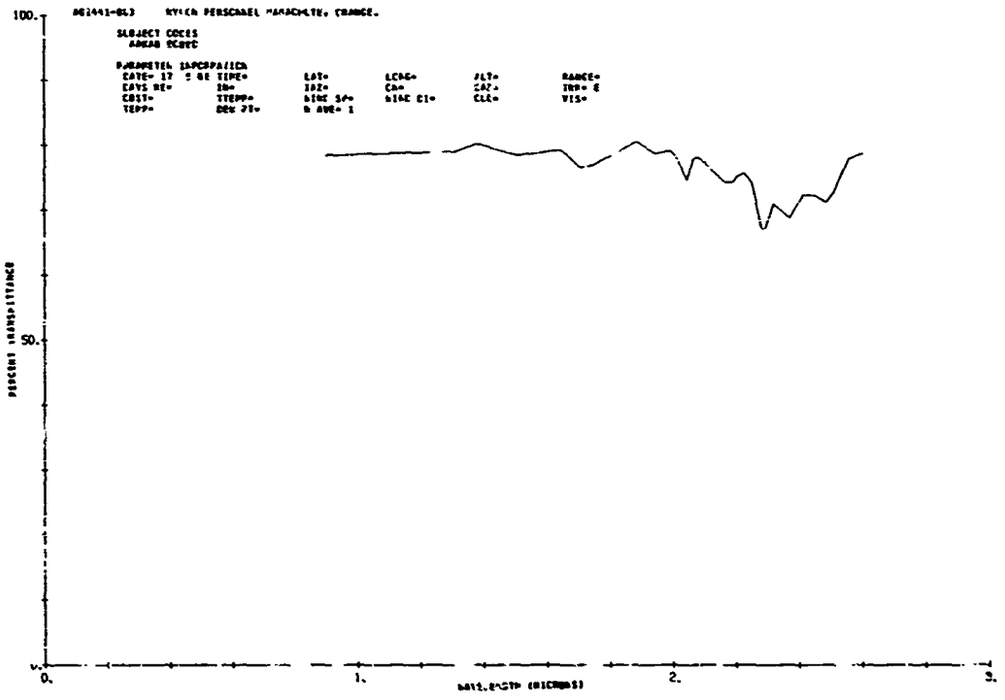
WAVELENGTH (MICRONS)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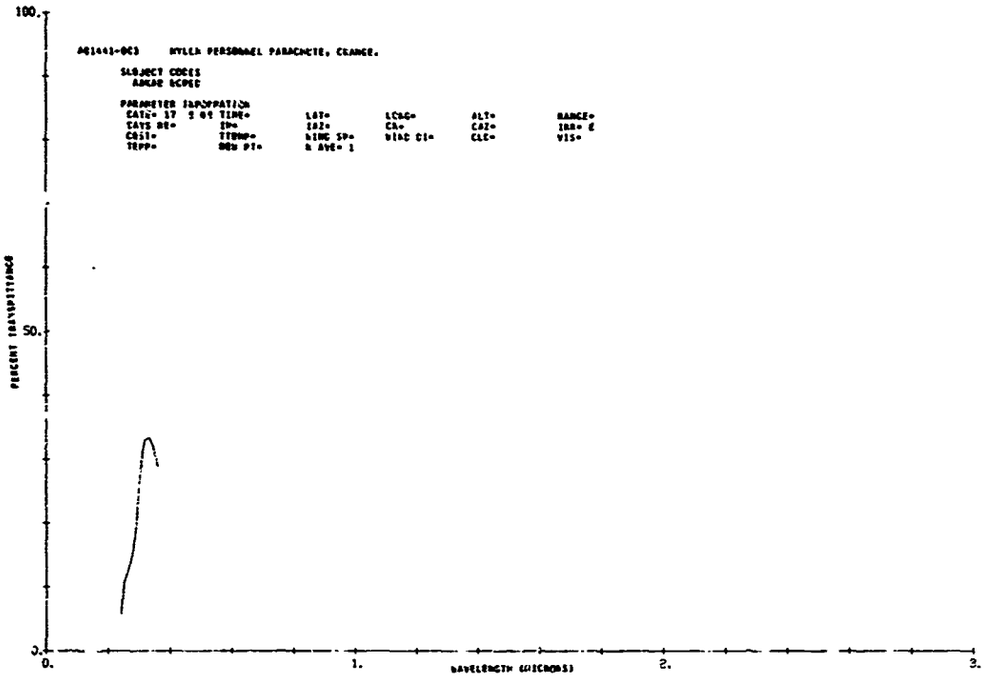
PERCENT TRANSMITTANCE


AC1441-0C3 NYLON PERSONNEL PARACHUTE, ORANGE.
SUBJECT CODES
AAKAB ECPED
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DAYS RE= IN= IAZ= CN= CAZ= IRR= E
COST= TTEMP= WIND SP= WIND DI= CLD= VIS=
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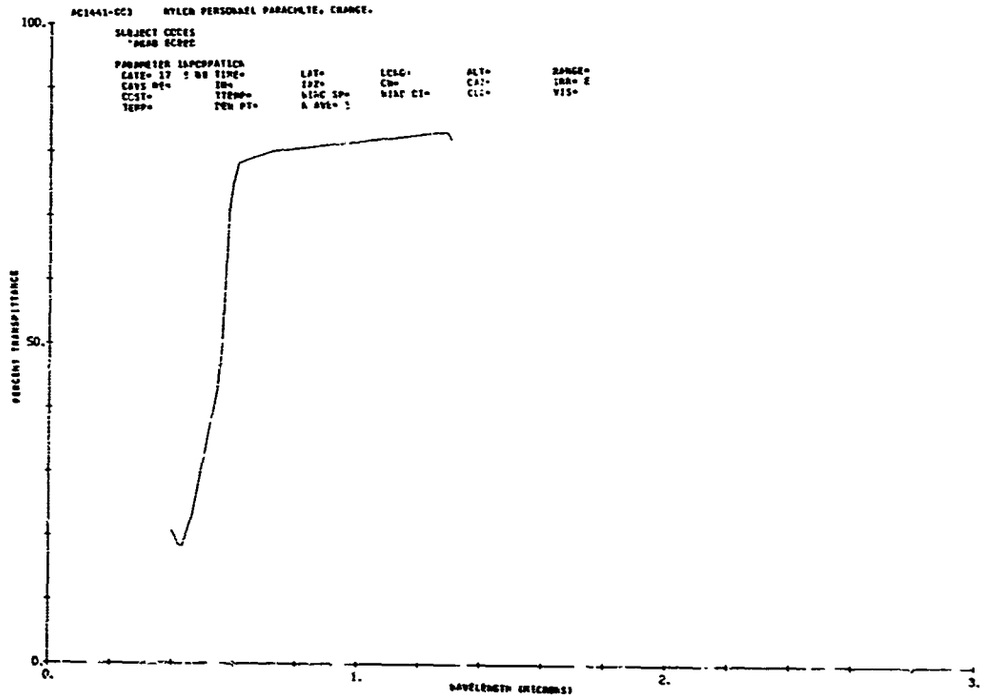
WAVELENGTH (MICRONS)


AC1441-0C3 NYLON PERSONNEL PARACHUTE, ORANGE.
SUBJECT CODES
AAKAB ECPED
PARAMETER INFORMATION
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COST= TTEMP= WIND SP= WIND DI= CLD= VIS=
TEMP= DEW PT= N AVE= 1
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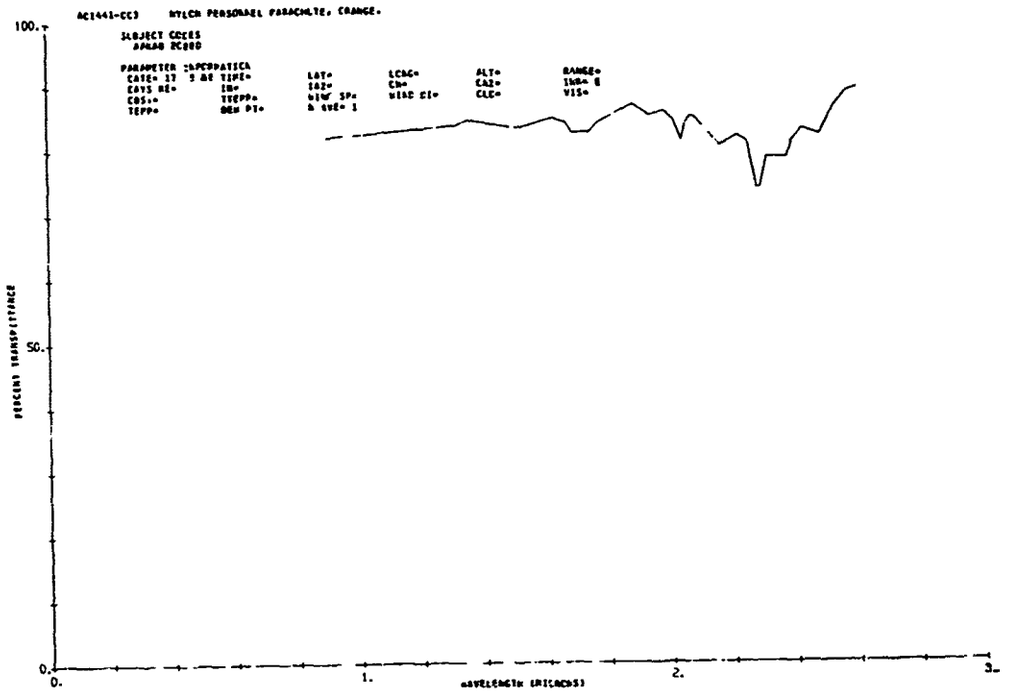
WAVELENGTH (MICRONS)

AAKA 83


AC1441-CC3 NYLON PERSONNEL PARACHUTE, ORANGE.
SUBJECT CODES
AAKAB 2C000
PARAMETER INFORMATION
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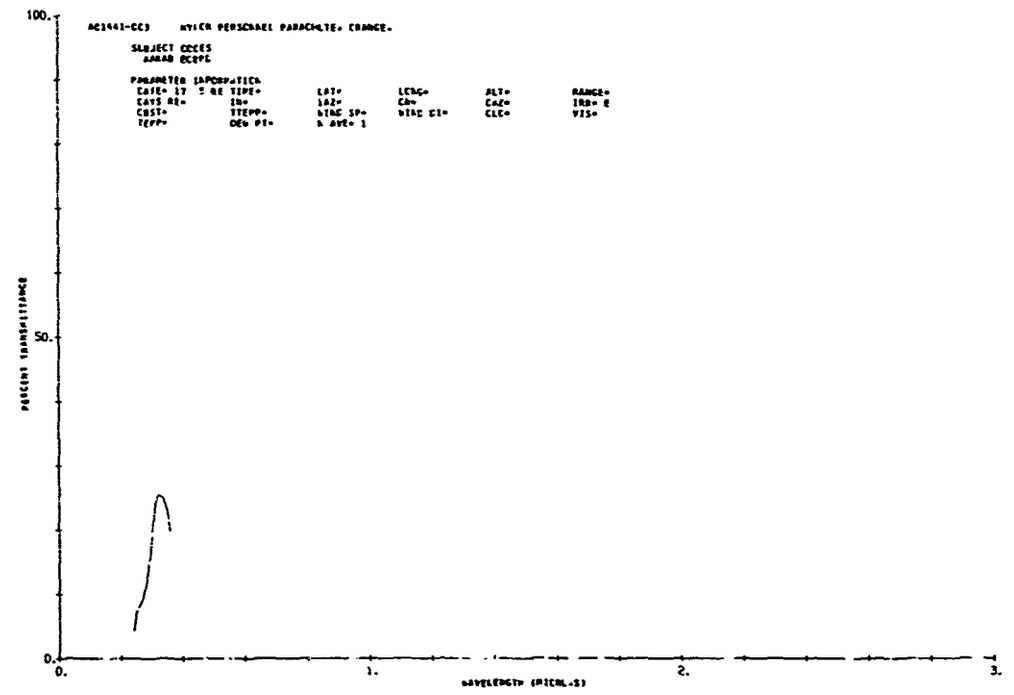
WAVELENGTH (MICRONS)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SUBJECT CODES
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PARAMETER INFORMATION
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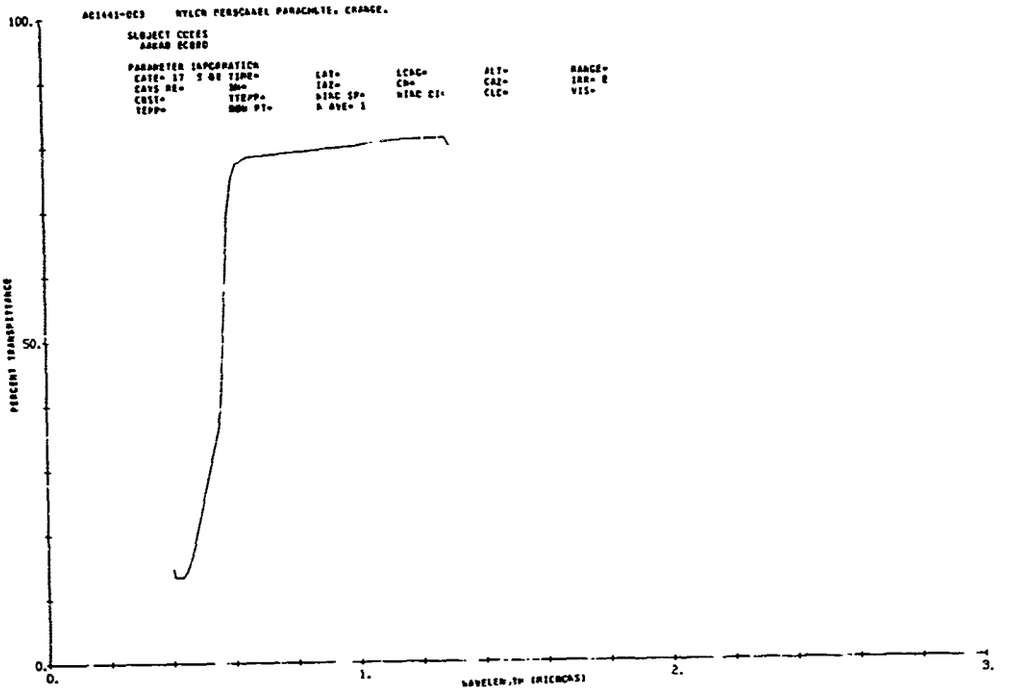
WAVELENGTH (MICRONS)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SUBJECT CODES
AAKAB ECOBD
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PERCENT TRANSMITTANCE
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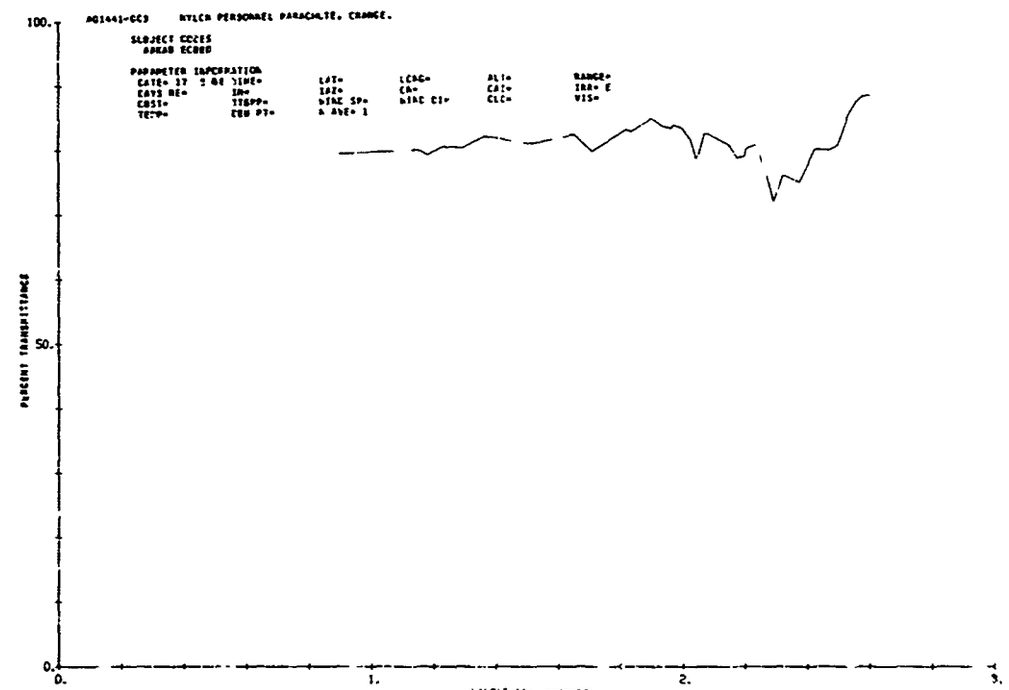
WAVELENGTH (MICRONS)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SUBJECT CODES
AAKAB ECOBD
PARAMETER INFORMATION
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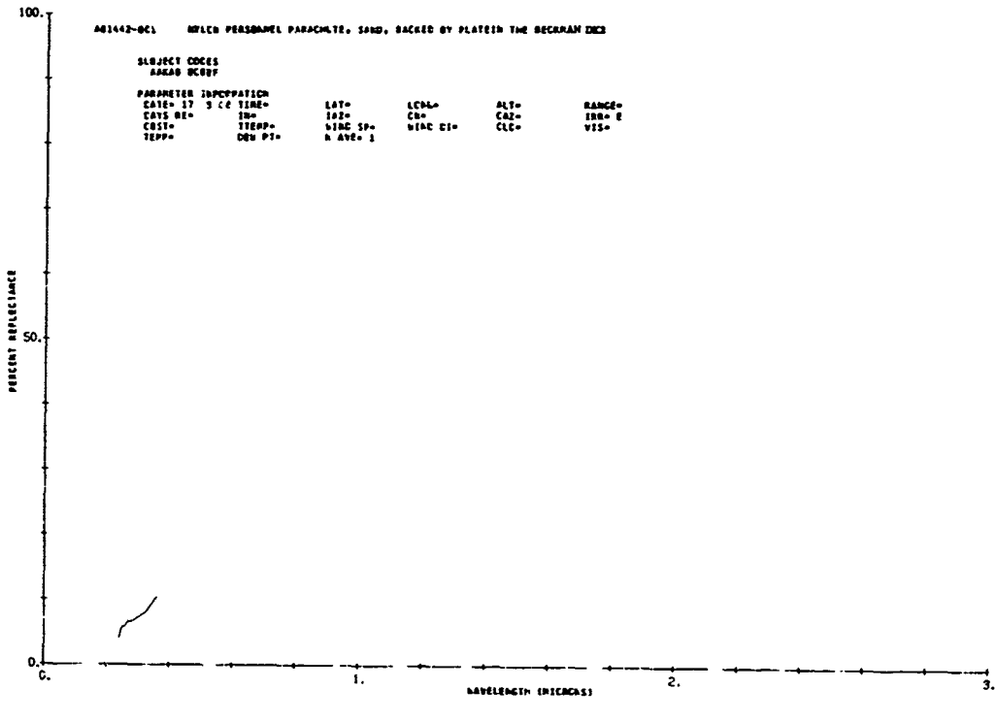
WAVELENGTH (MICRONS)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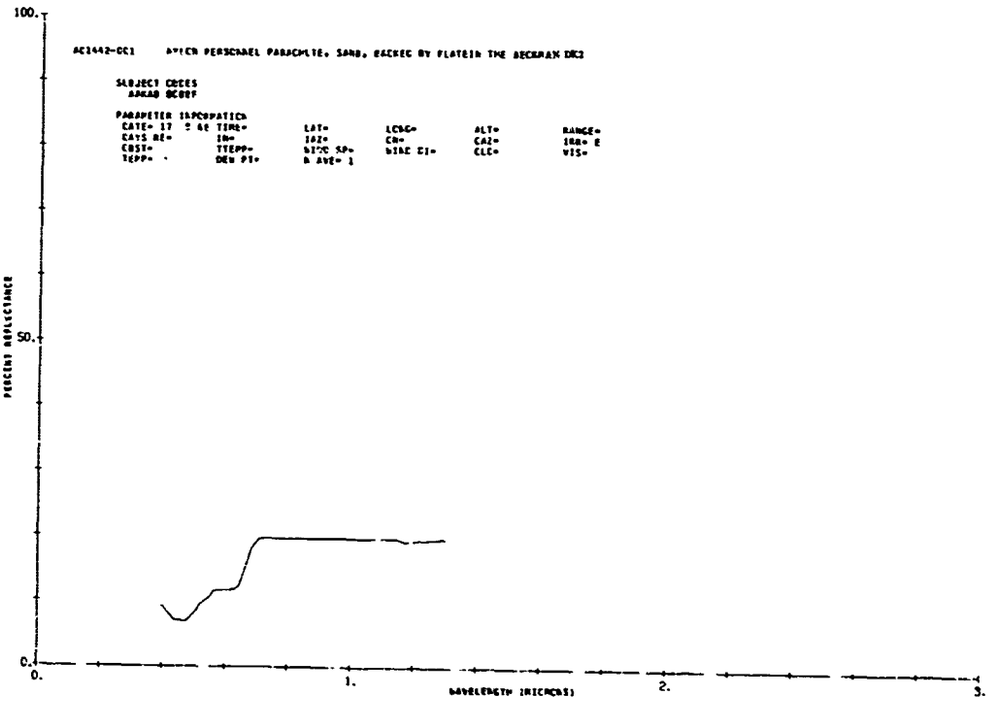
WAVELENGTH (MICRONS)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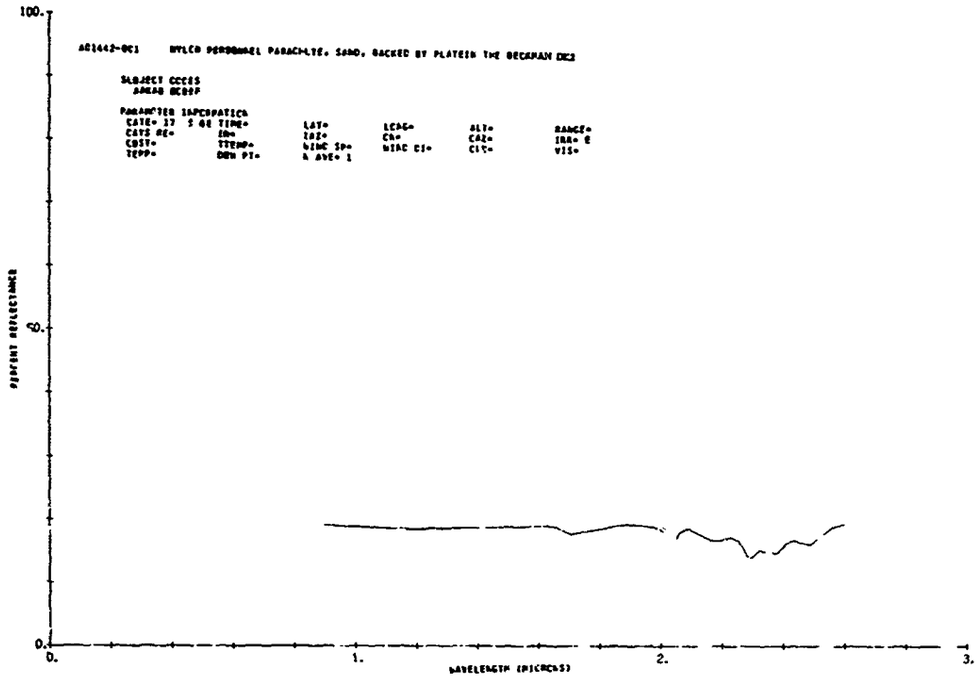
WAVELENGTH (MICRONS)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AR1442-0C1 NYLON PERSONNEL PARACHUTE, SAND, BACKED BY PLATEIN THE BECKMAN DK2
SUBJECT CODES
AAKAA BCBOP
PARAMETER INFORMATION
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TEPP=
IR=
TTEMP=
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LENG=
CR=
WIAC DI=
ALT=
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VIS=
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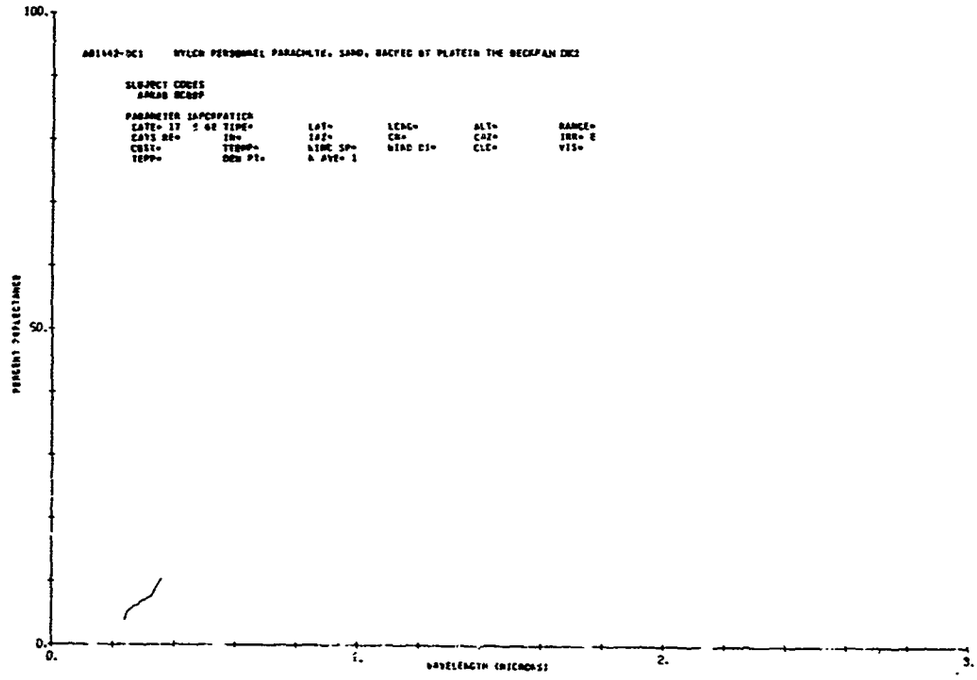
WAVELENGTH (MICRONS)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AR1442-0C1 NYLON PERSONNEL PARACHUTE, SAND, BACKED BY PLATEIN THE BECKMAN DK2
SUBJECT CODES
AAKAA BCBOP
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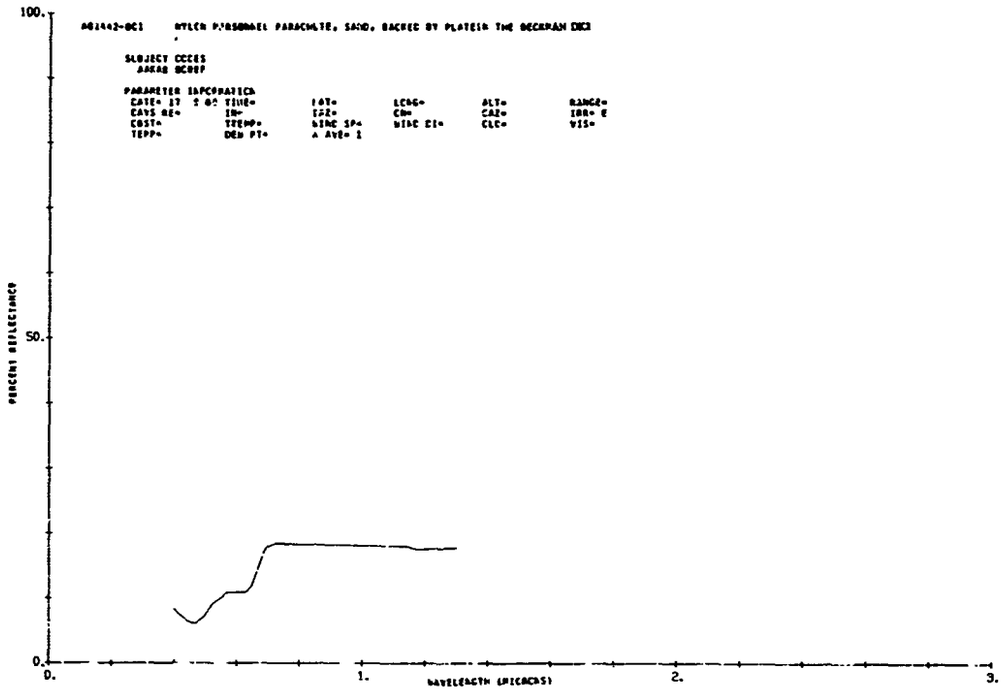
AR1442-0C1 NYLON PERSONNEL PARACHUTE, SAND, BACKED BY PLATEIN THE DECRPAN DK3
SUBJECT CODES
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PERCENT REFLECTANCE
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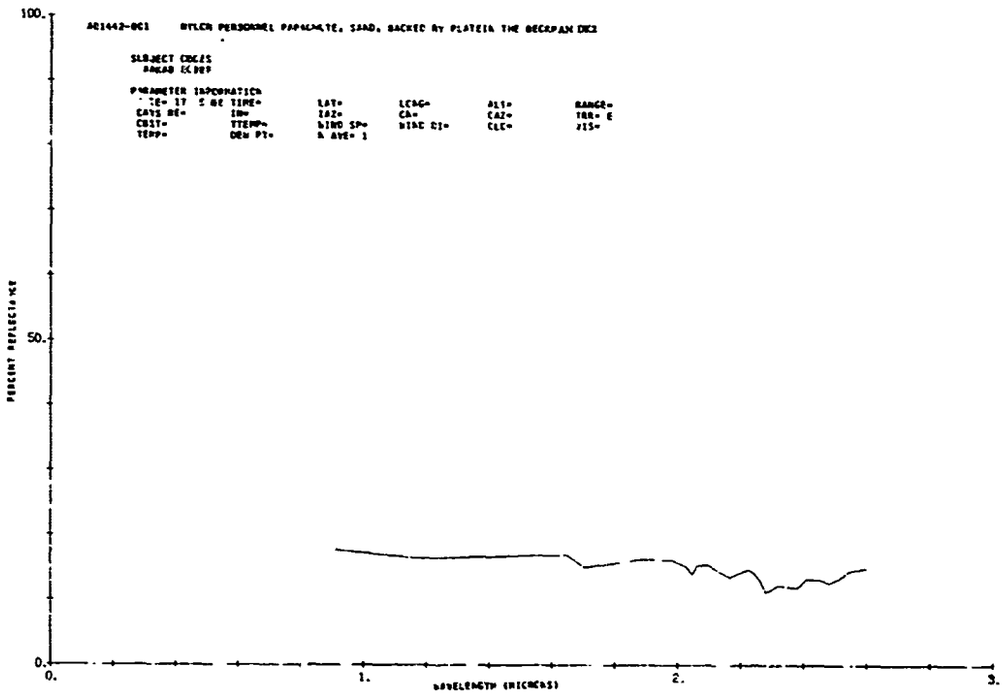
WAVELENGTH (MICRONS)


AR1442-0C1 NYLON PERSONNEL PARACHUTE, SAND, BACKED BY PLATEIN THE DECRPAN DK3
SUBJECT CODES
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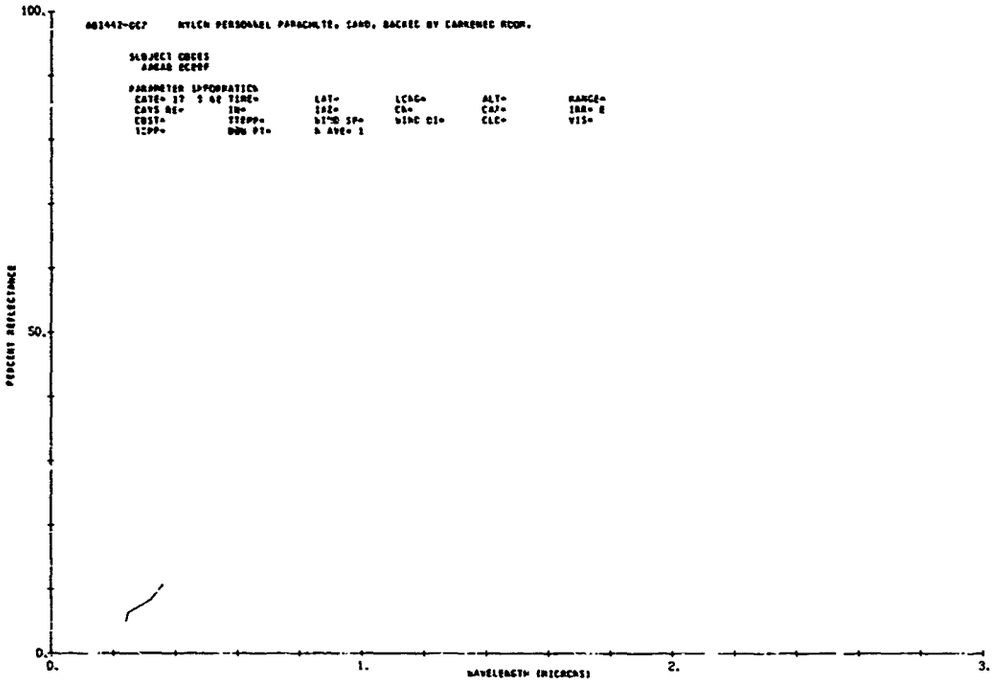
WAVELENGTH (MICRONS)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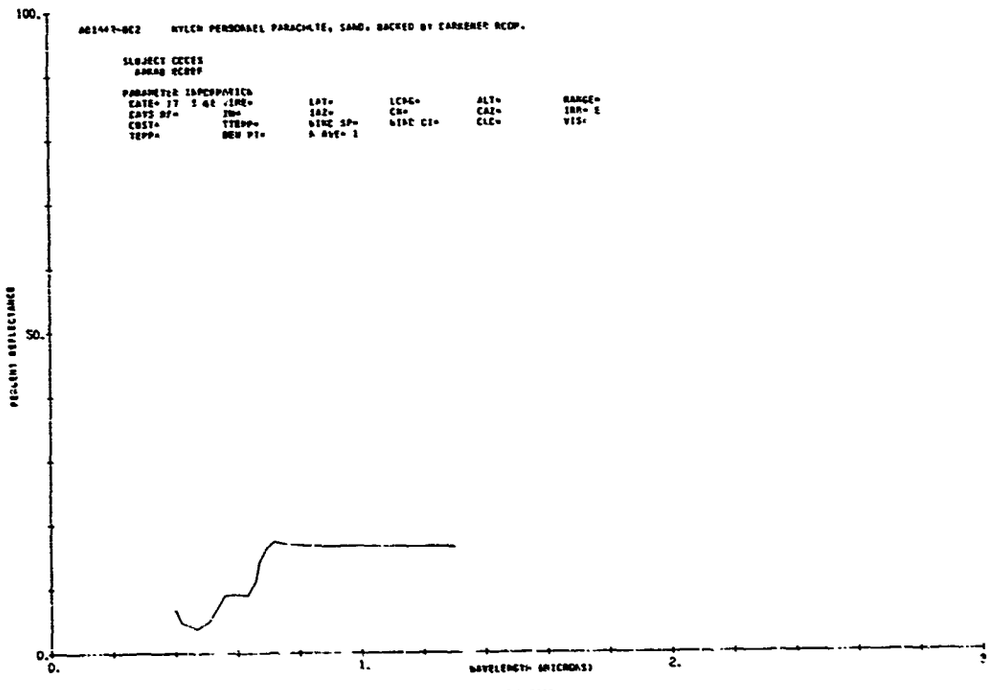
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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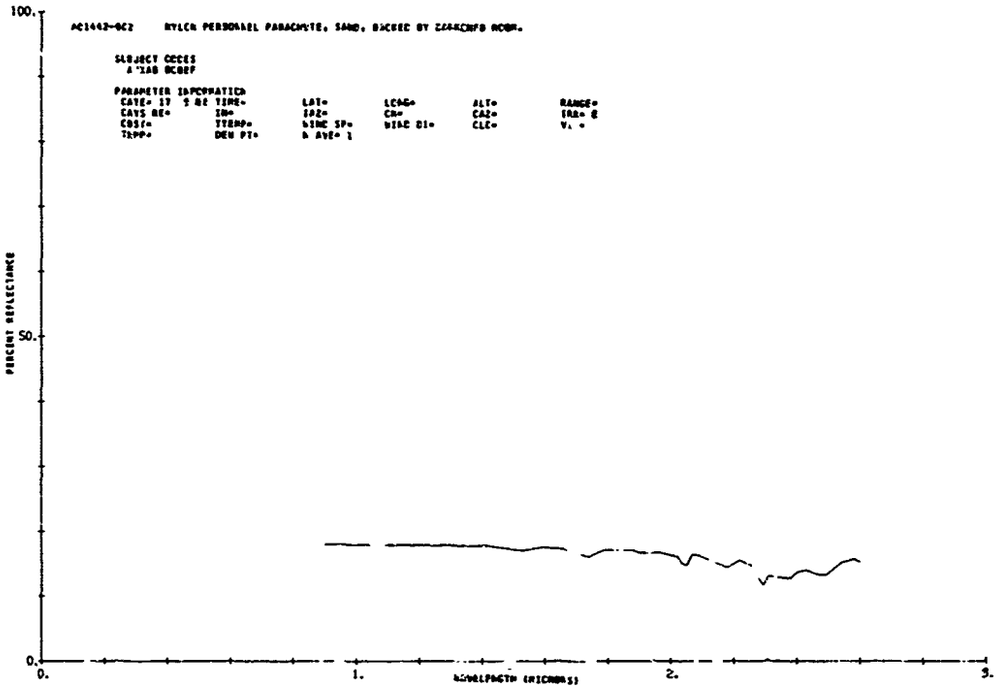
WAVELENGTH (MICRONS)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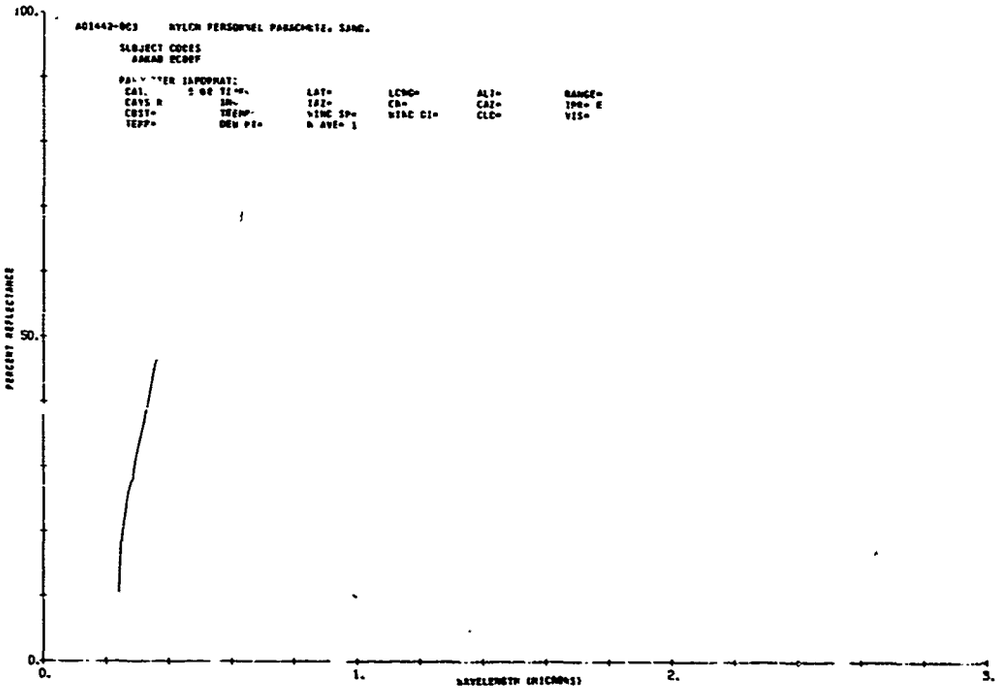
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PERCENT REFLECTANCE
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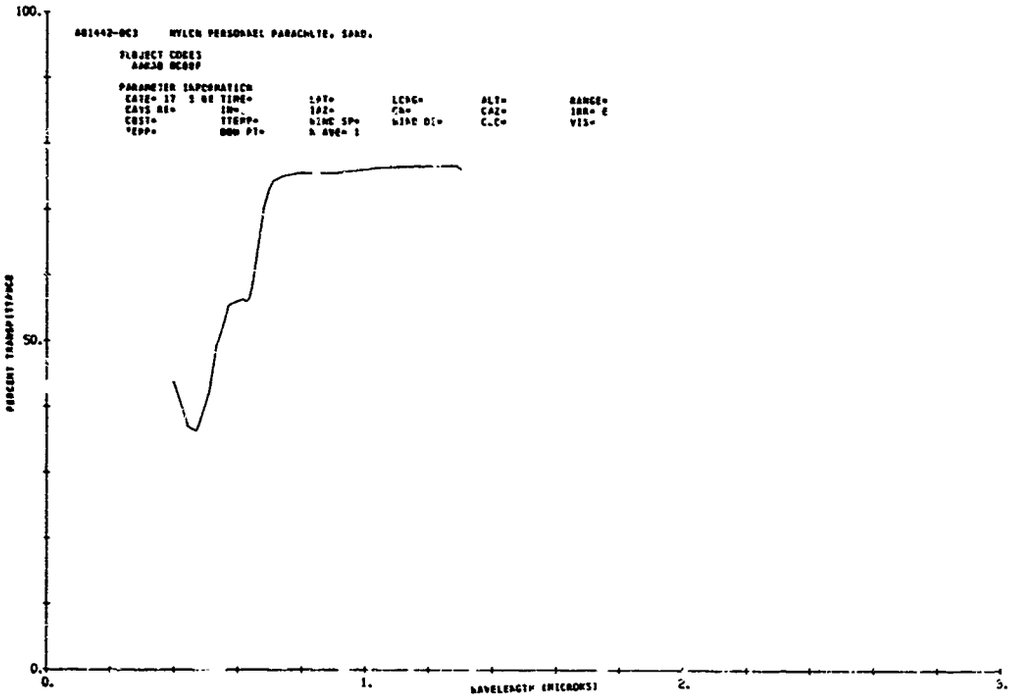
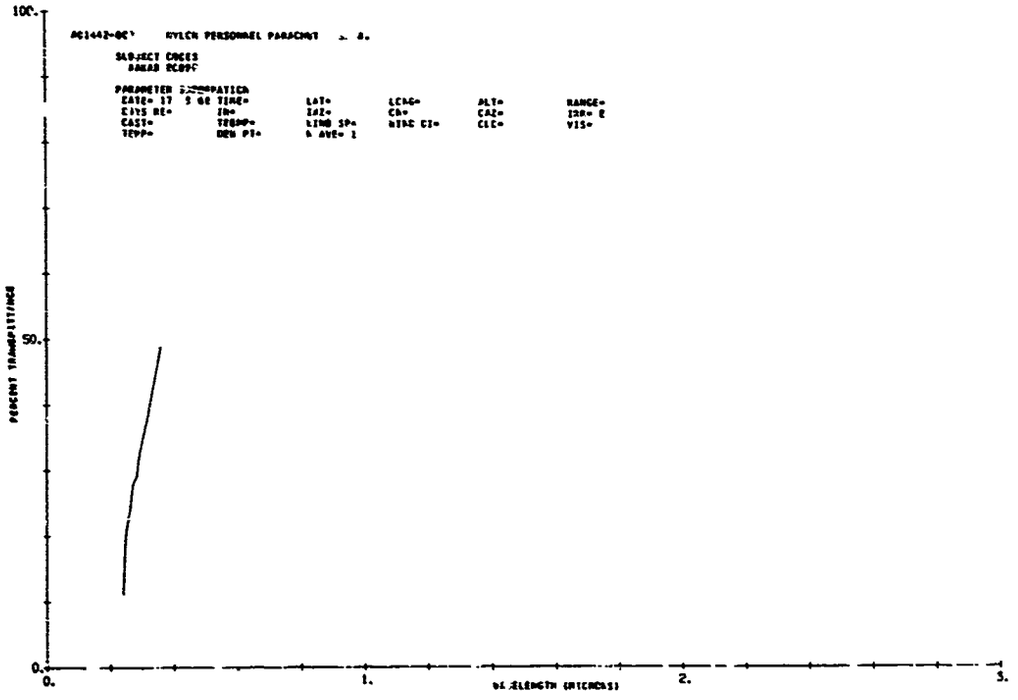
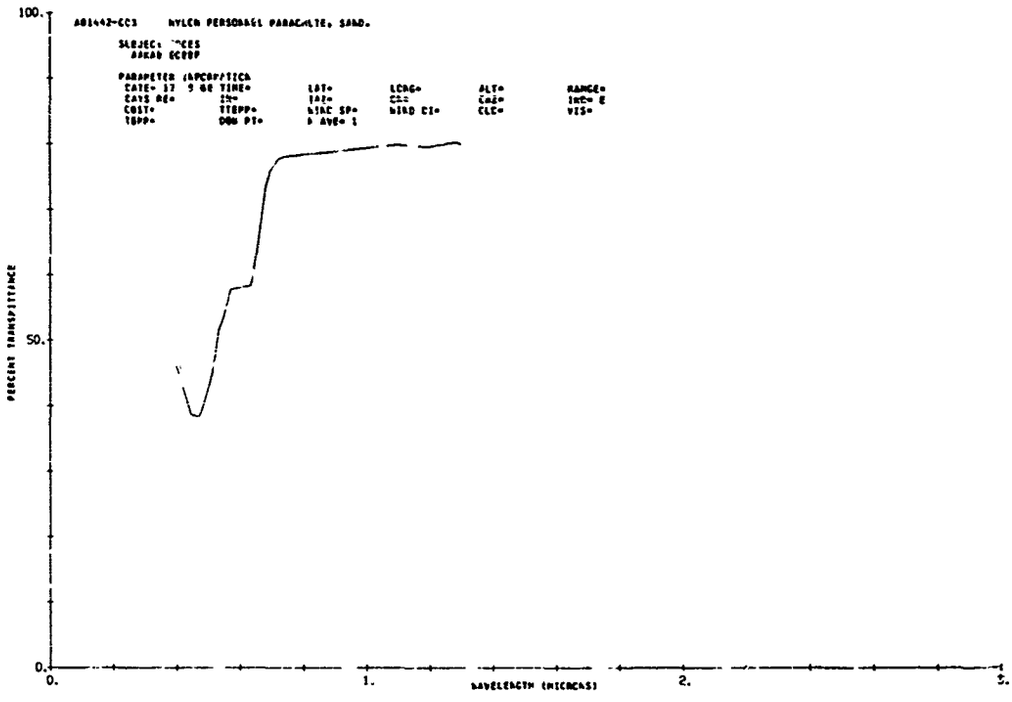
WAVELENGTH (MICRONS)

AIAA 90





July 1963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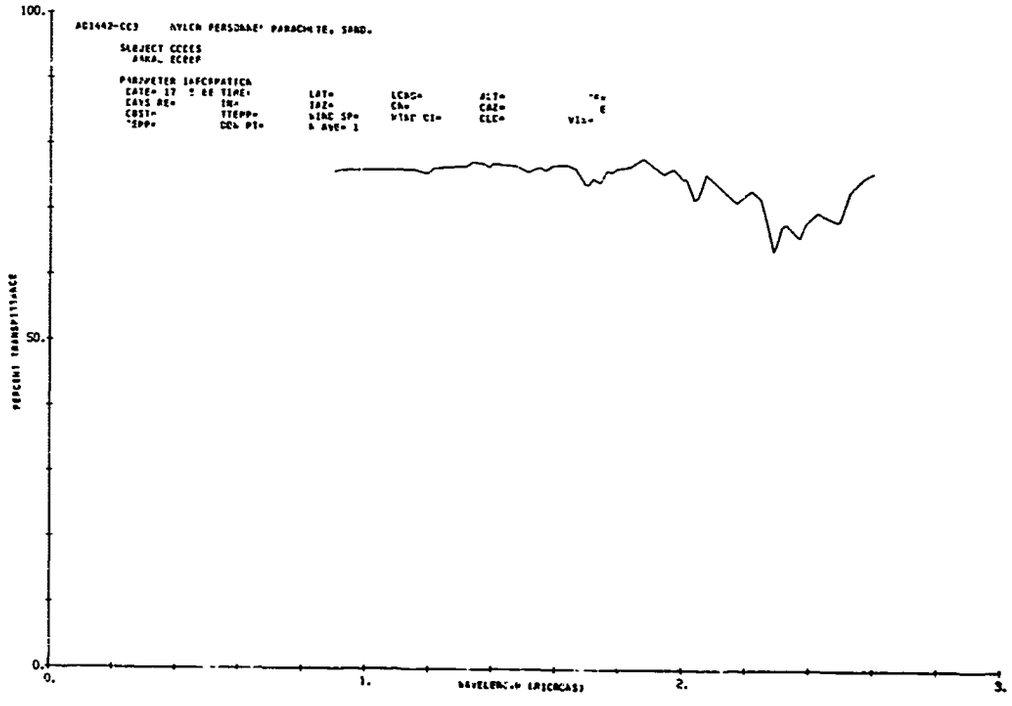
WAVELENGTH (MICRONS)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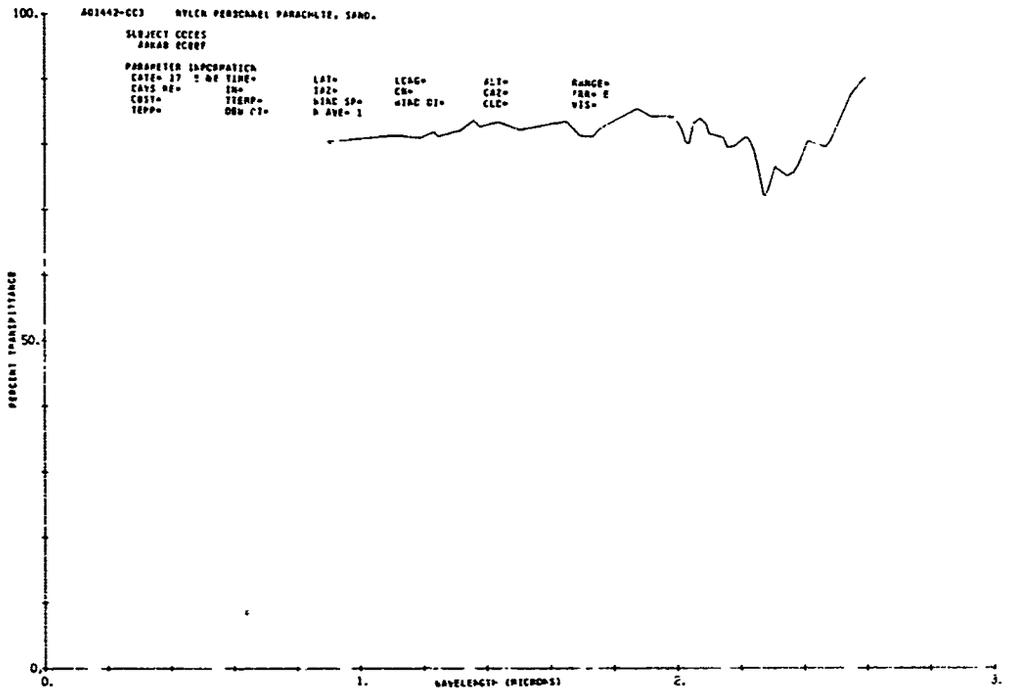
PERCENT TRANSMITTANCE


AD1442-CC3 NYLON PERSONNEL PARACHUTE, SAND.
SUBJECT CCCES
AAKAB CCBBF
PARAMETER INFORMATION
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CA=
WIND SP=
WIND DI=
ALT=
CAZ=
CLE=
RANGE=
TRR= E
VIS=
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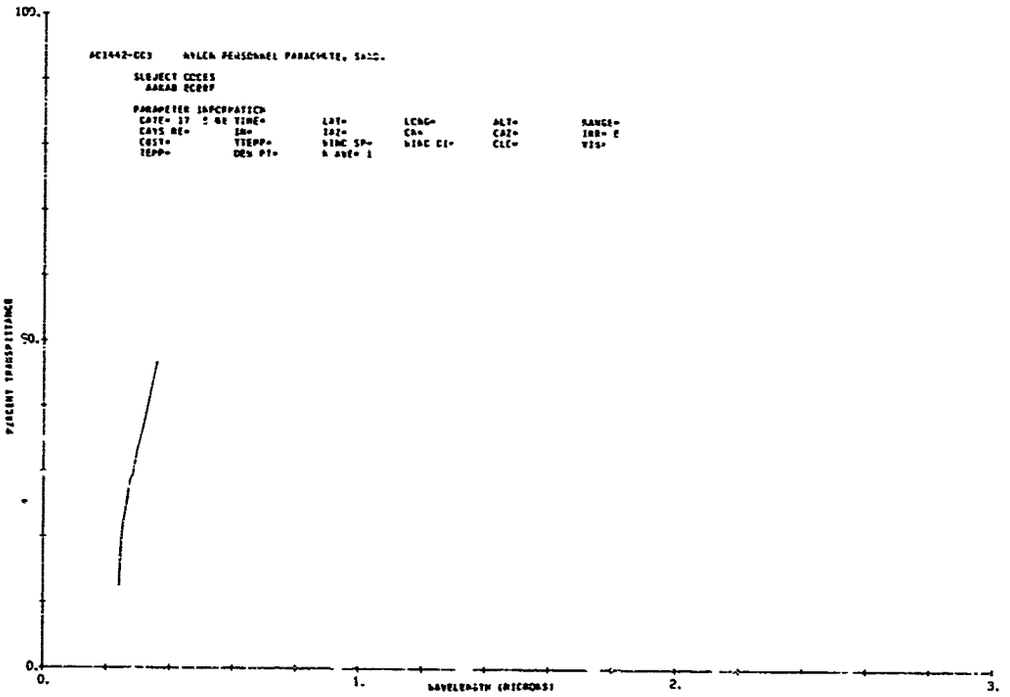
WAVELENGTH (MICRONS)


AD1442-CC3 NYLON PERSONNEL PARACHUTE, SAND.
SUBJECT CCCES
AAKAB CCBBF
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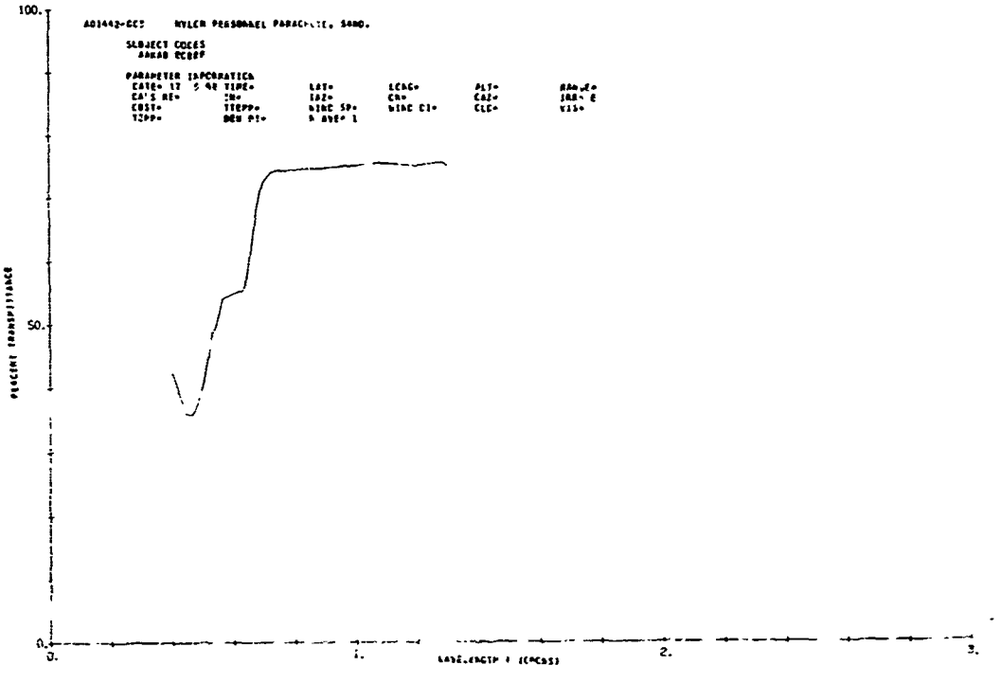
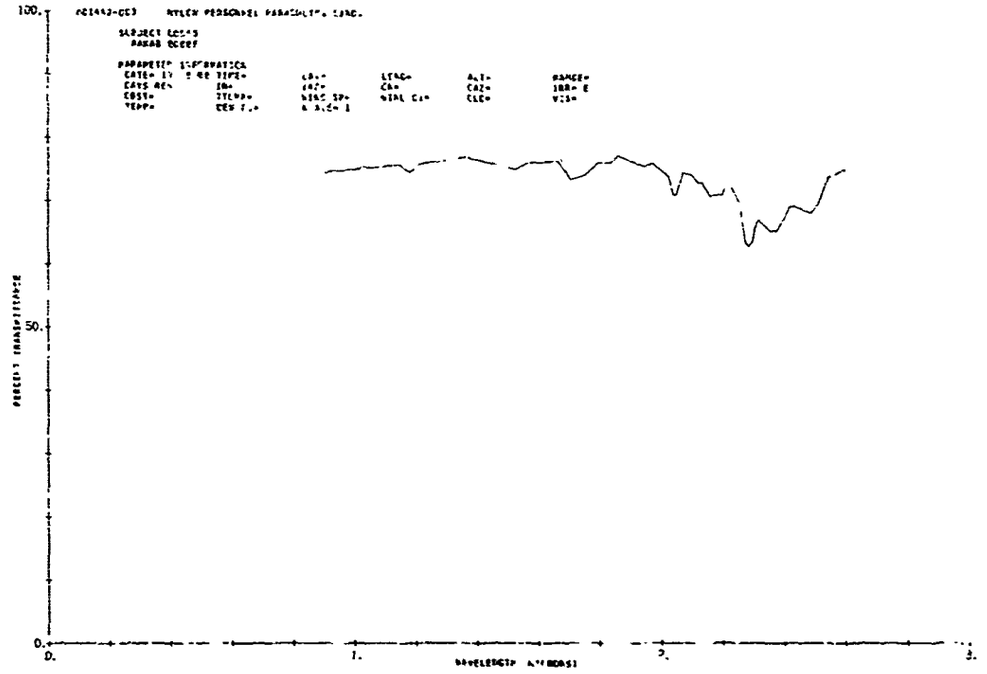
2.
3.
WAVELENGTH (MICRONS)

AAMA 83





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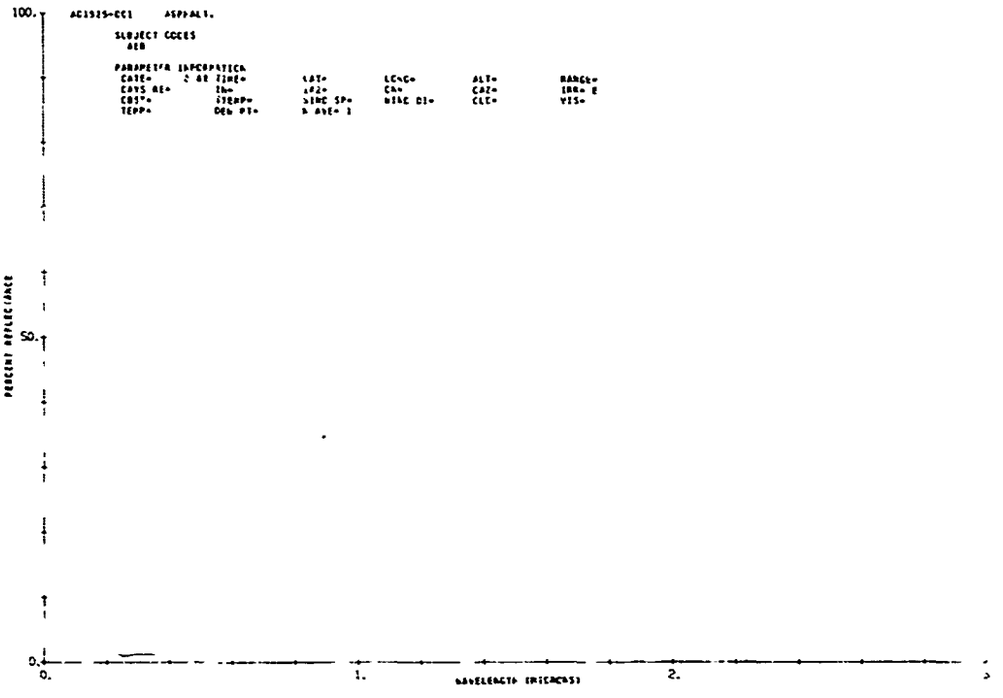
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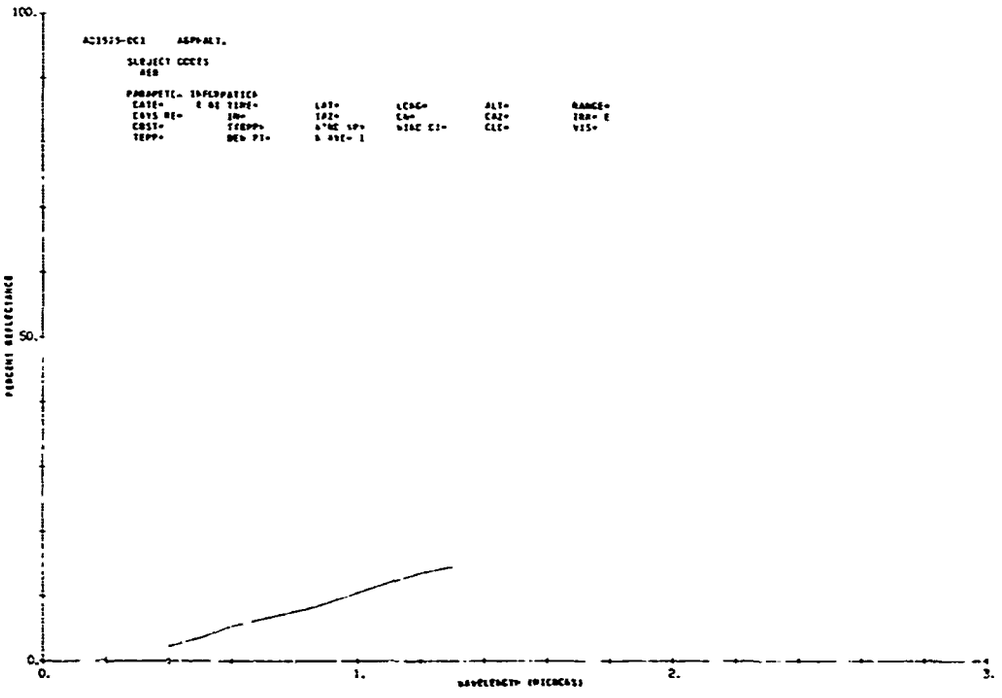
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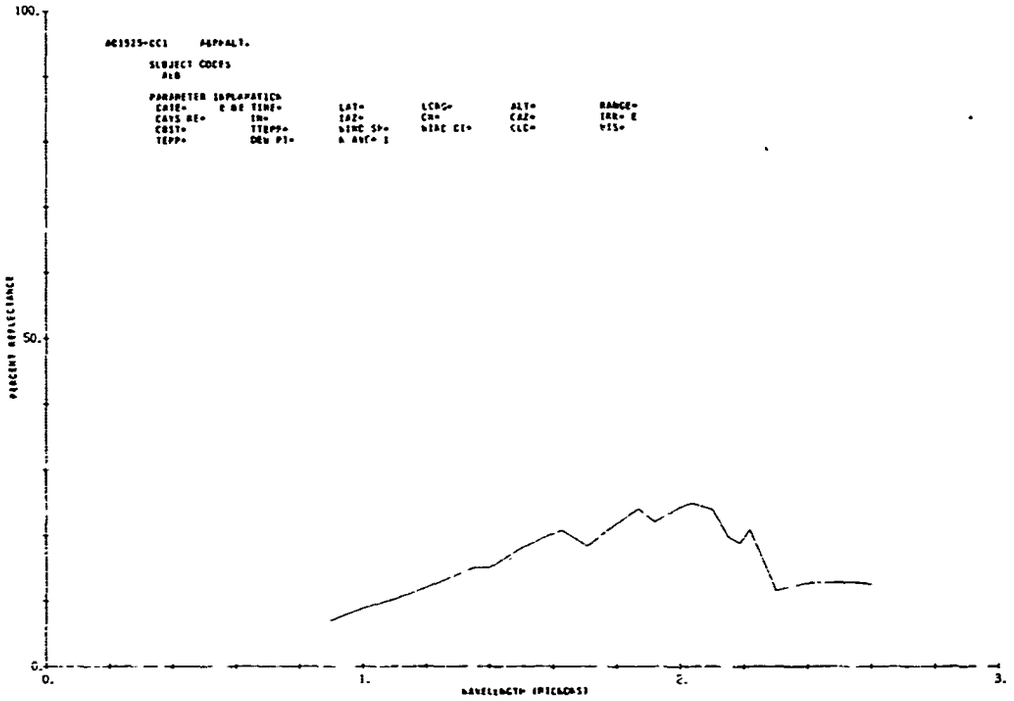

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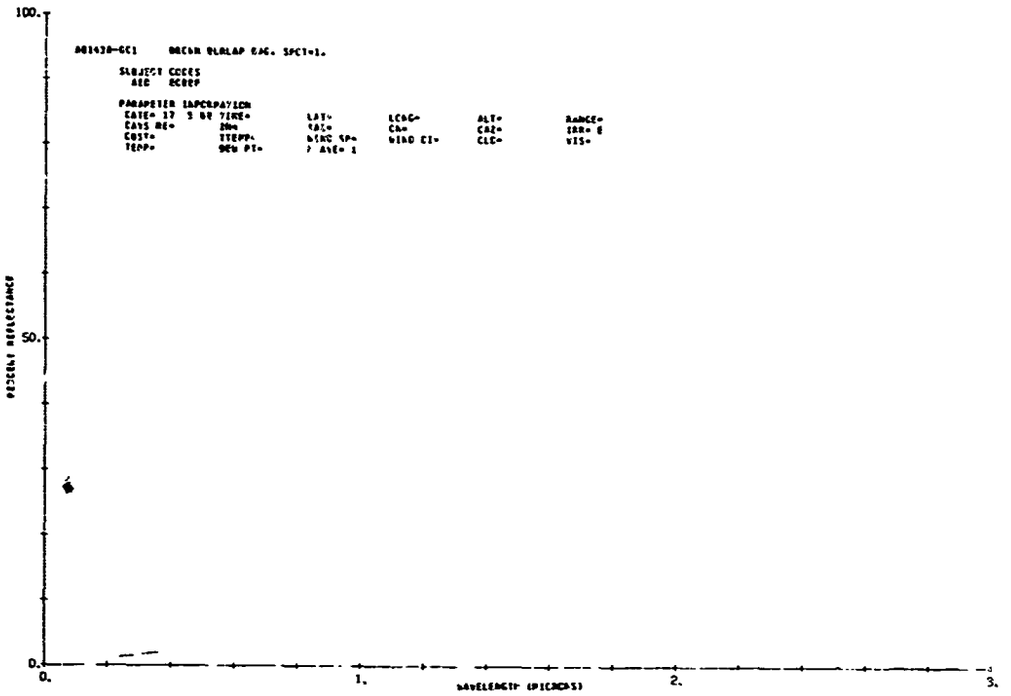
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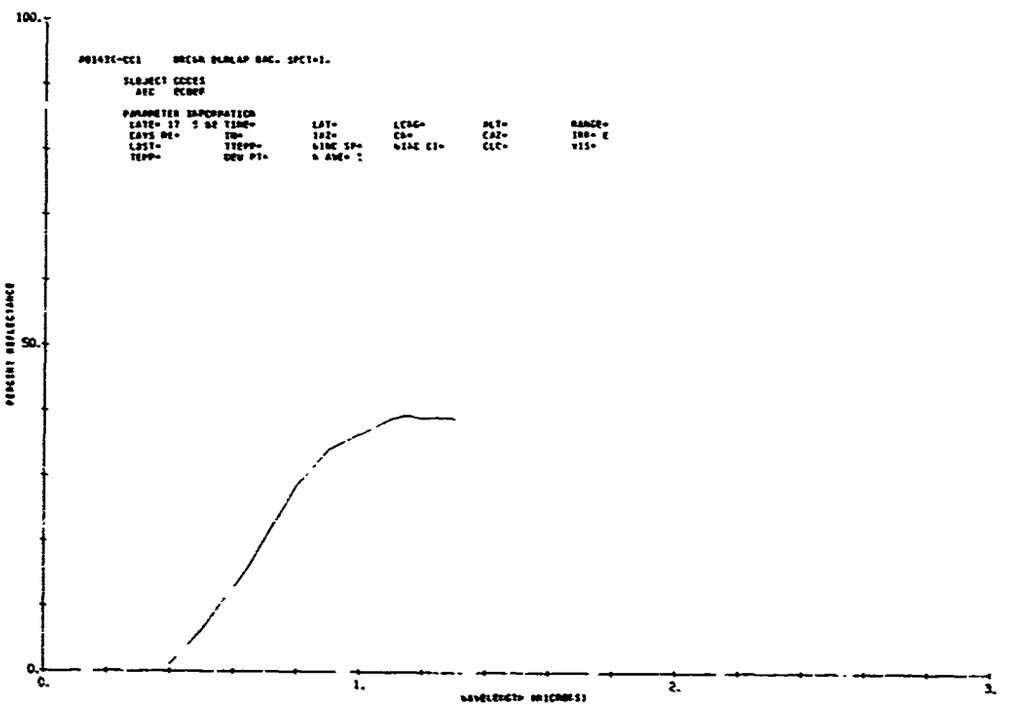
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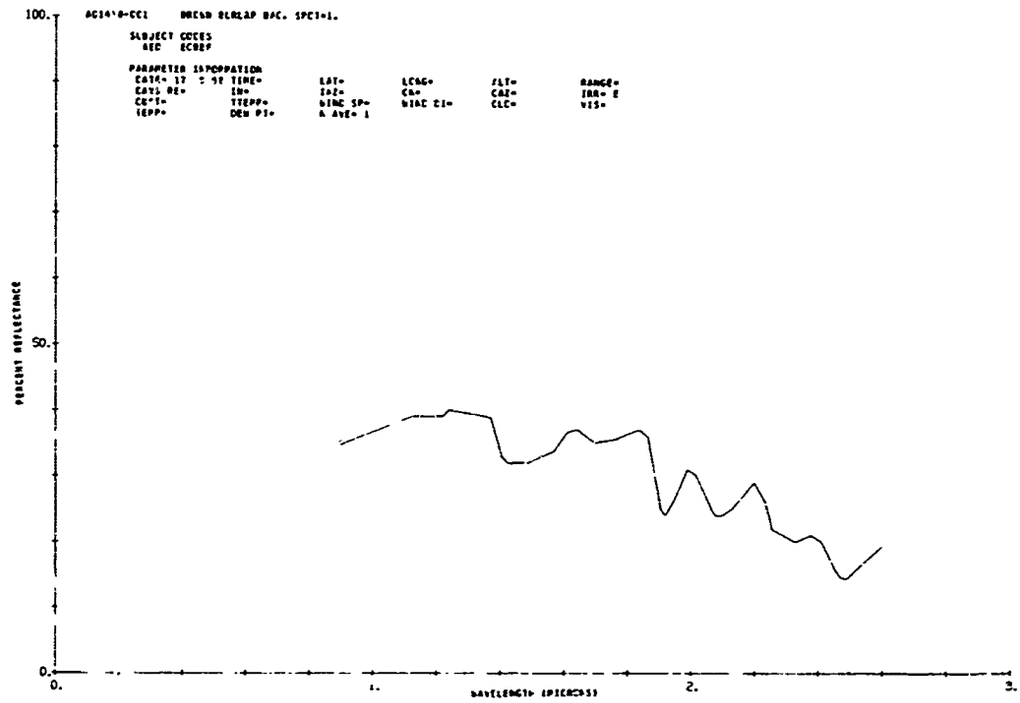
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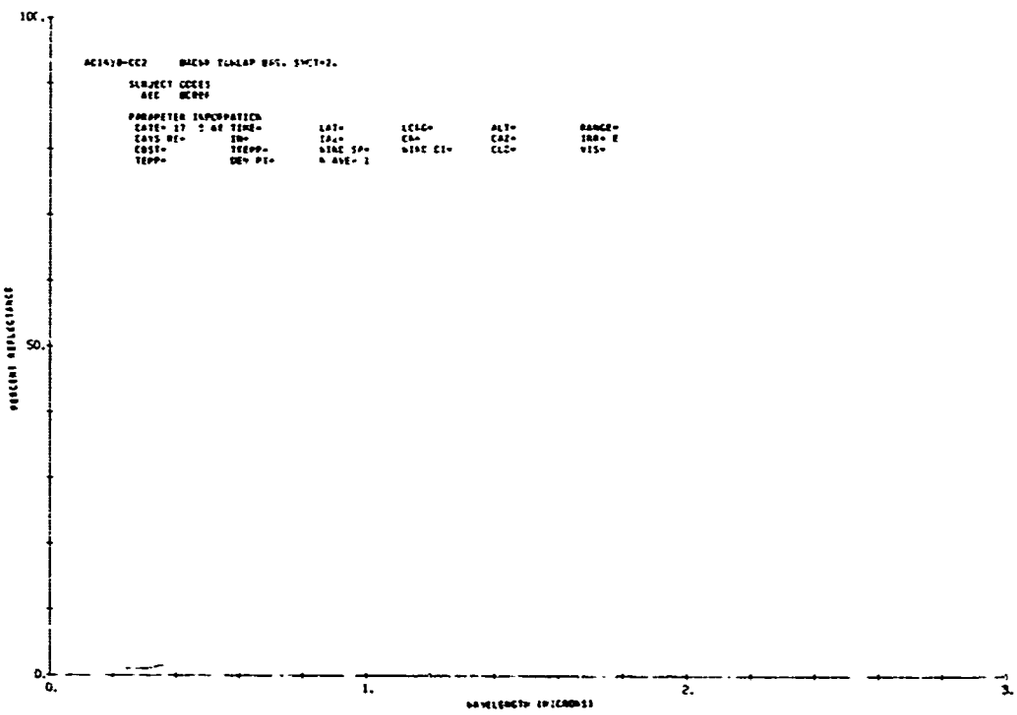
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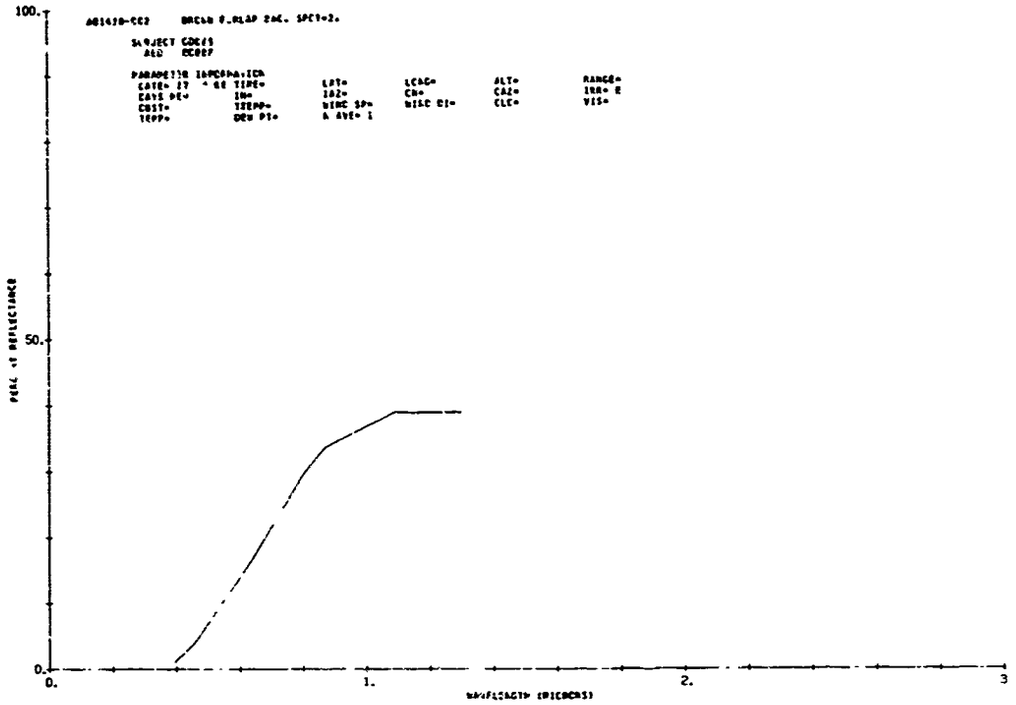
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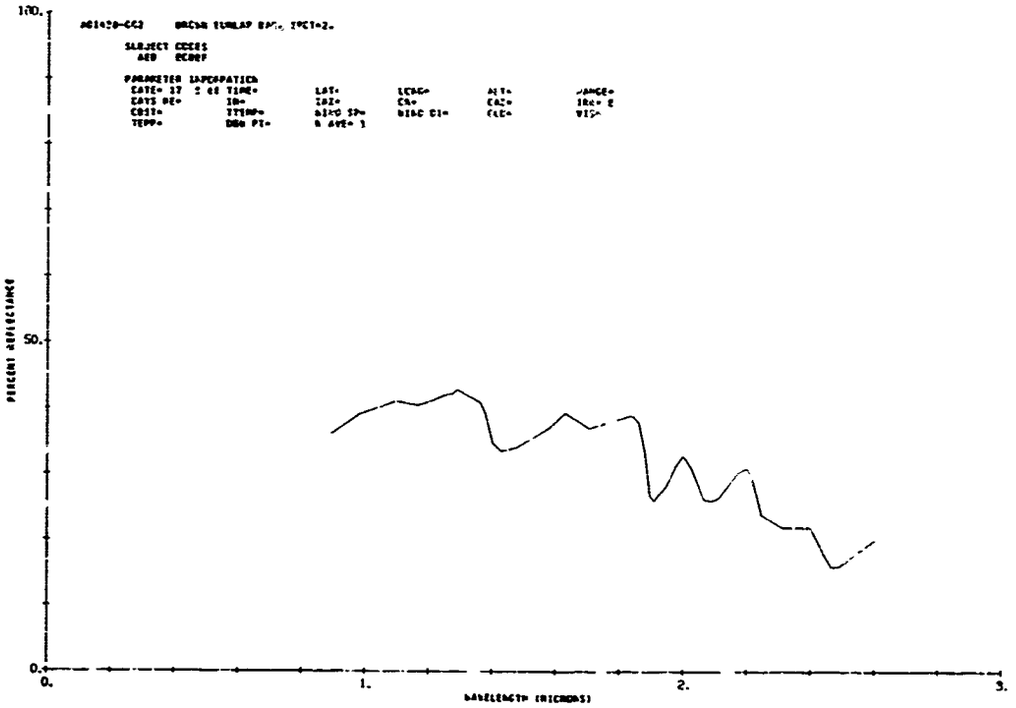
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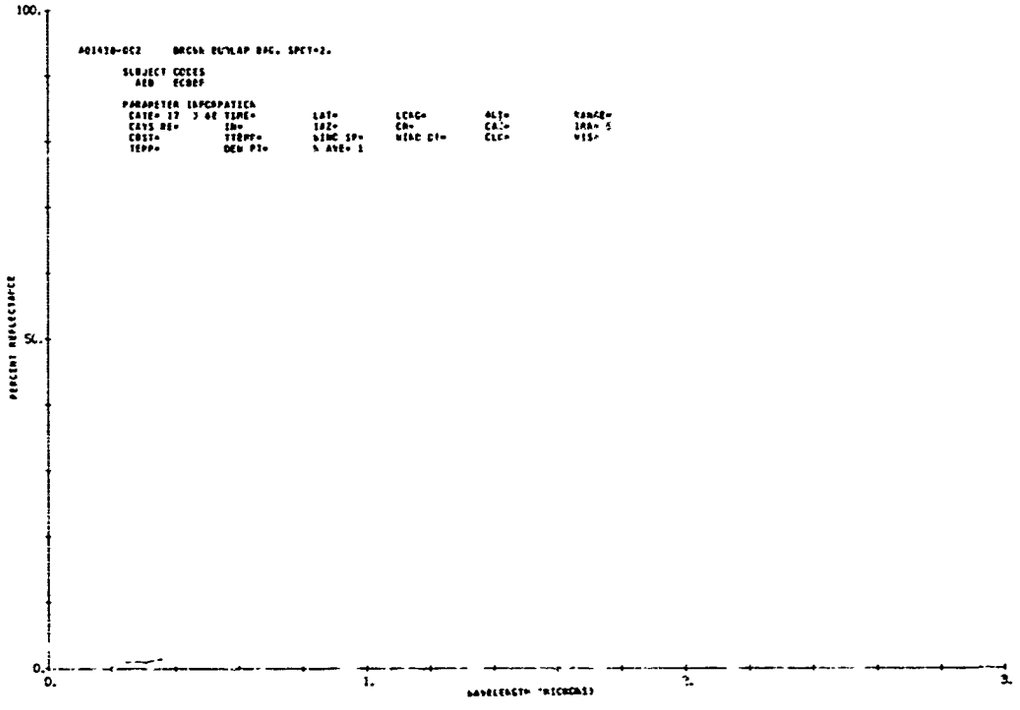
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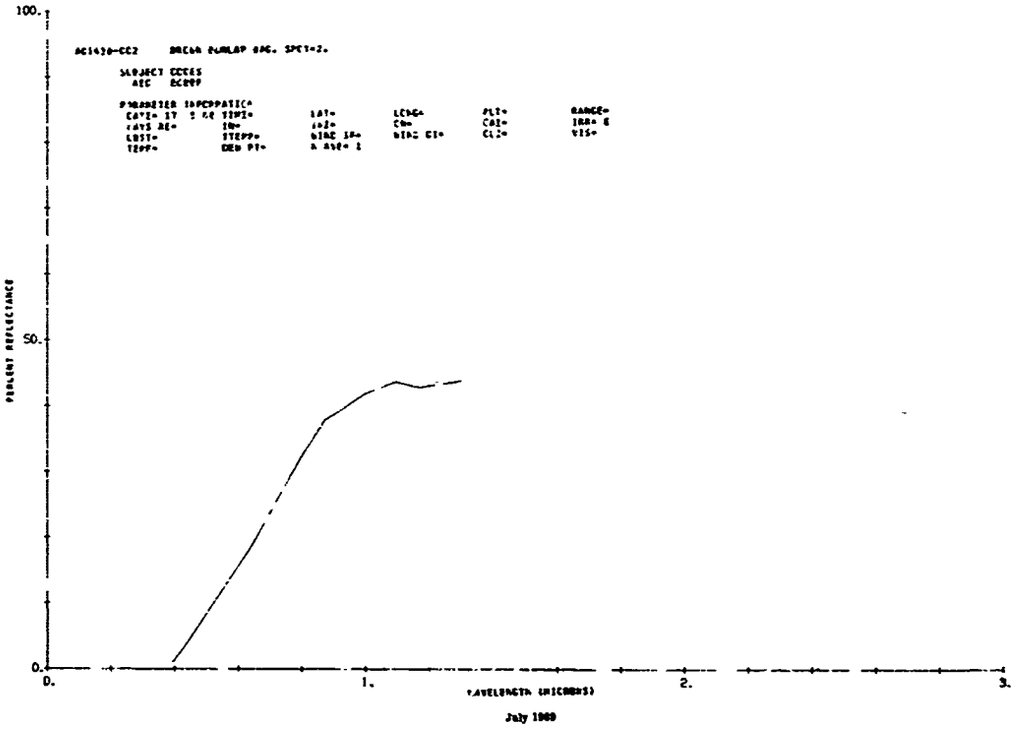
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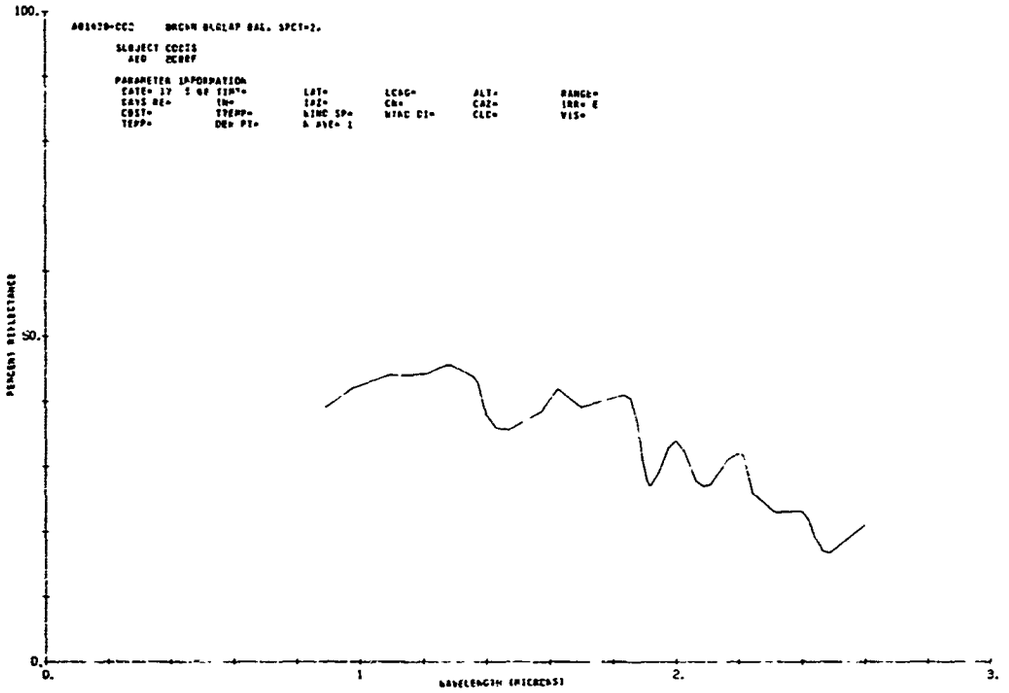
WAVELENGTH (MICRONS)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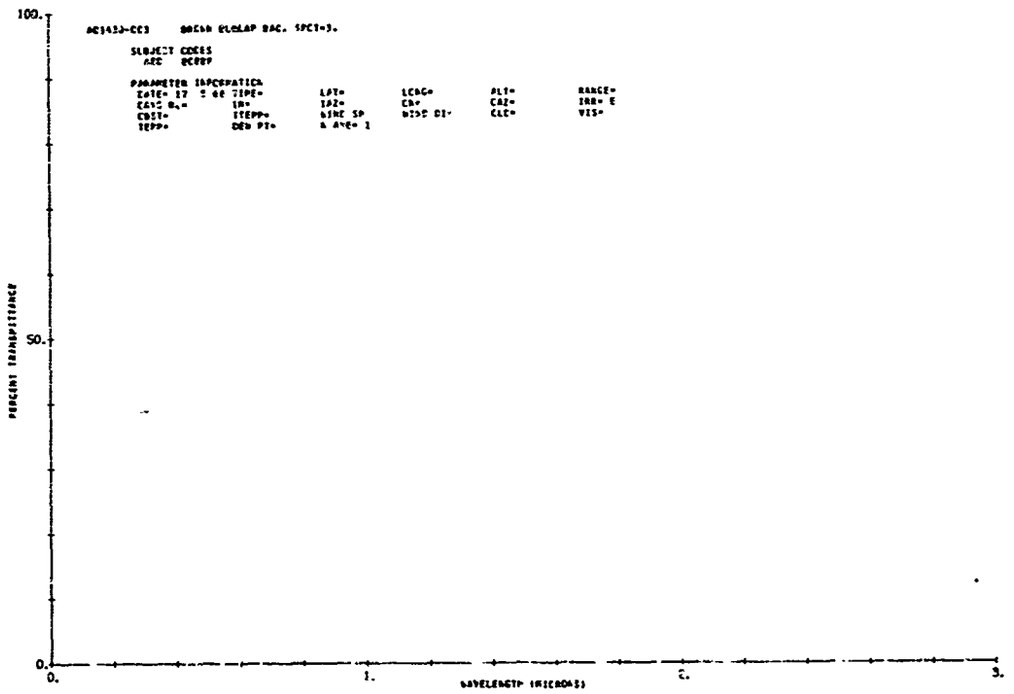
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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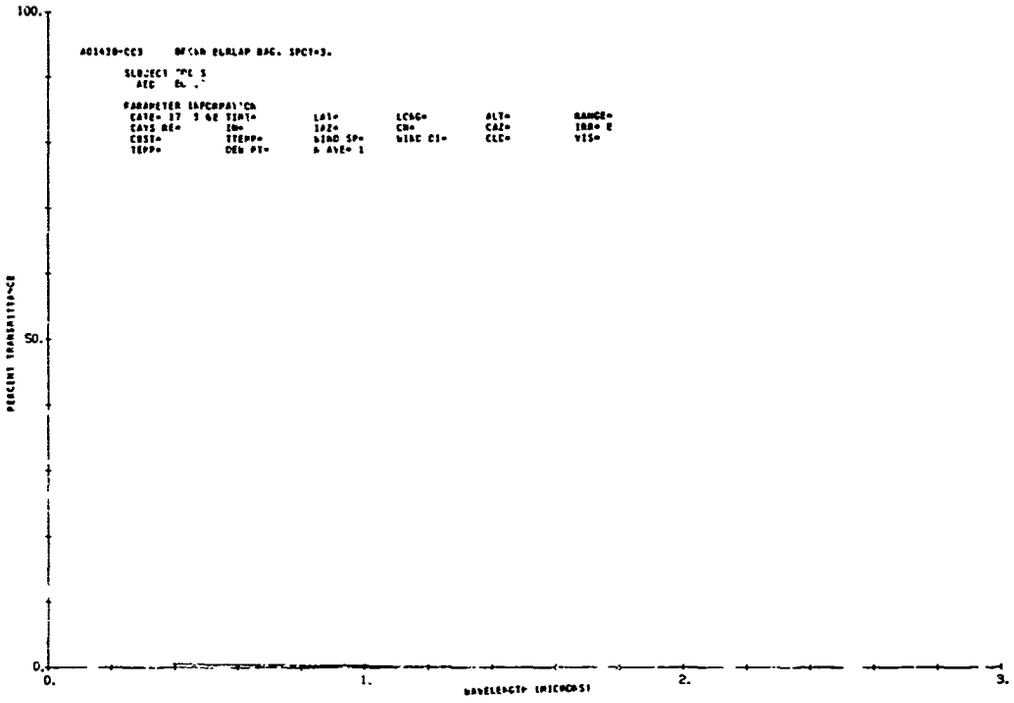
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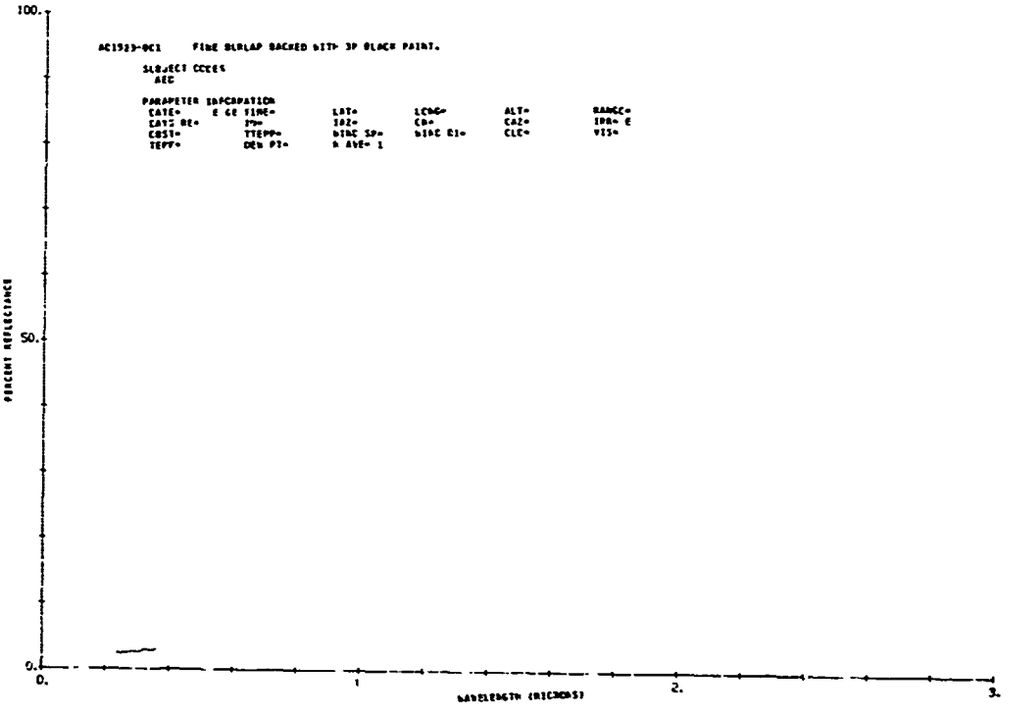
WAVELENGTH (MICRONS)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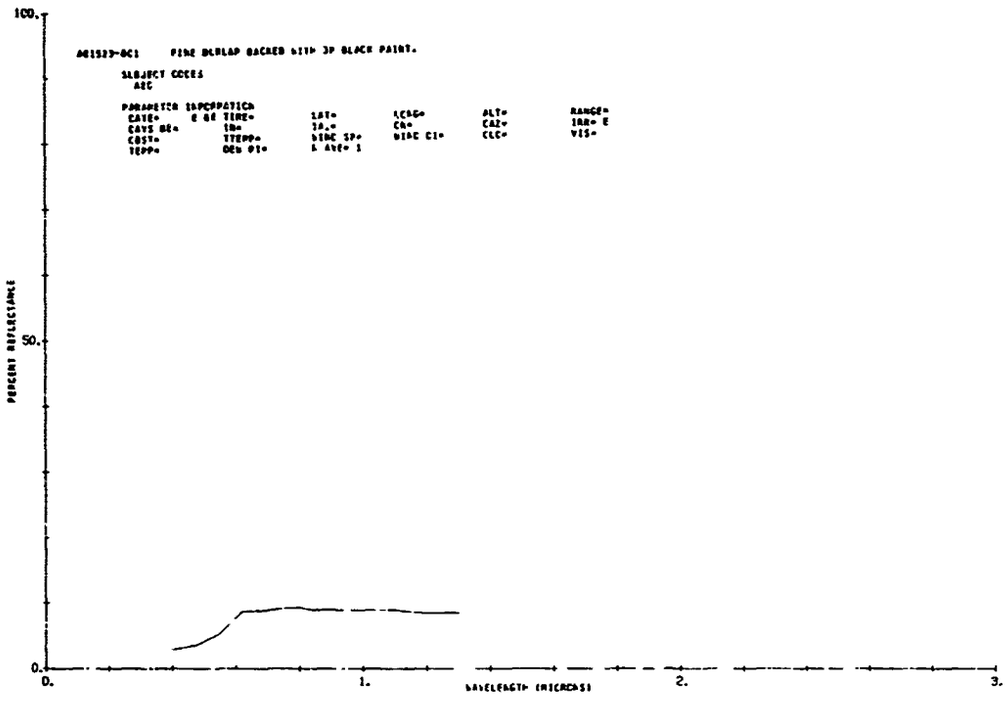
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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AE1523-0C1 FINE BURLAP BACKED WITH 3P BLACK PAINT.
SUBJECT CODES
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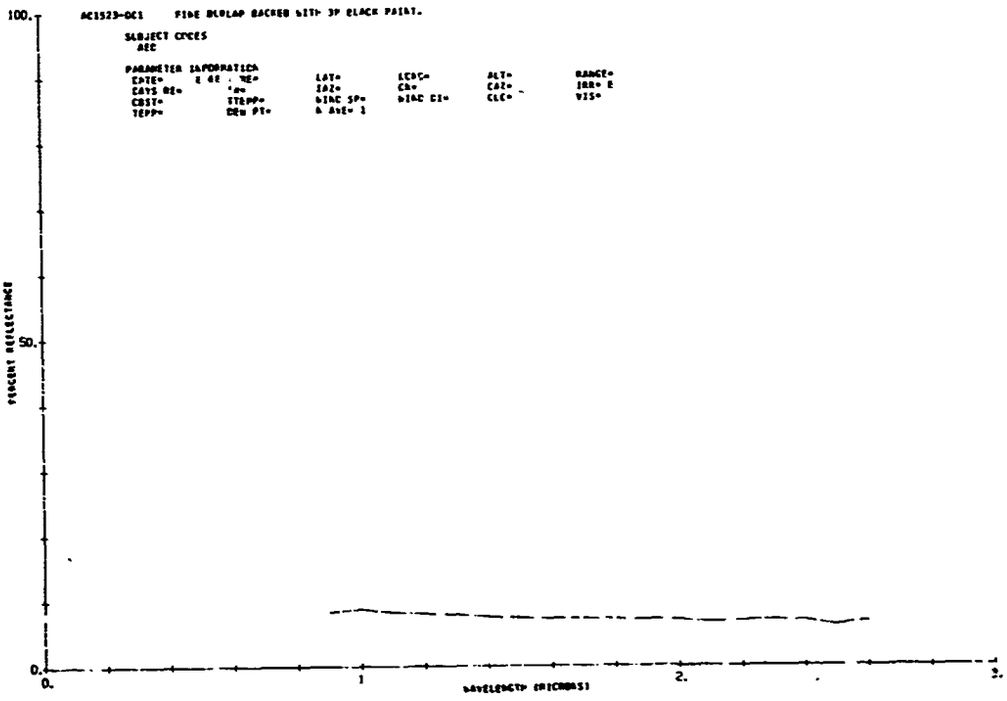
WAVELENGTH (MICRONS)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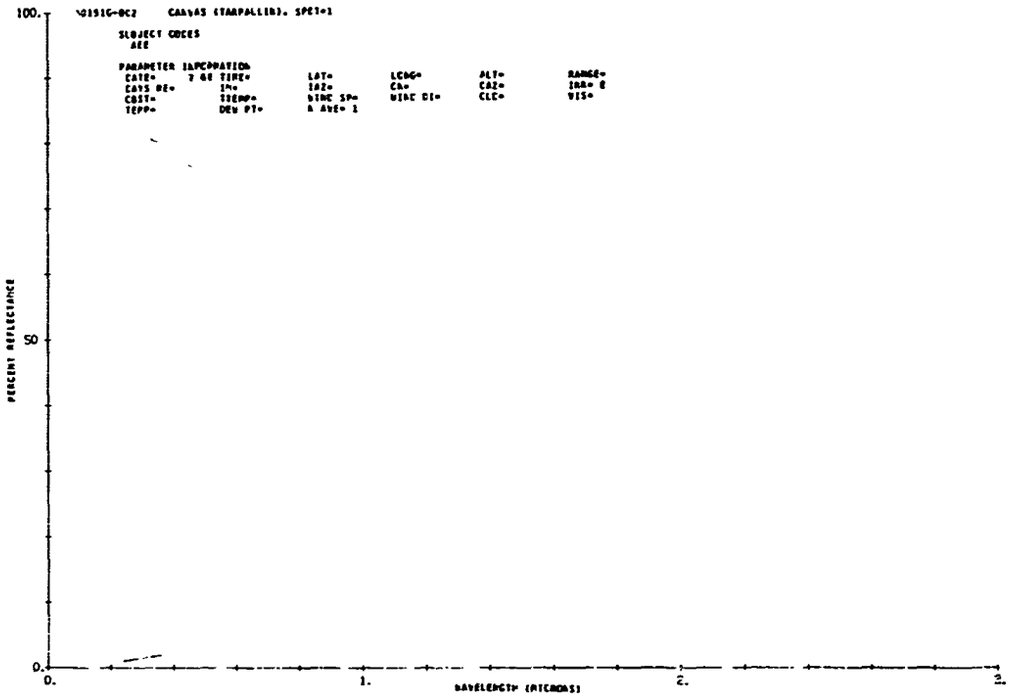
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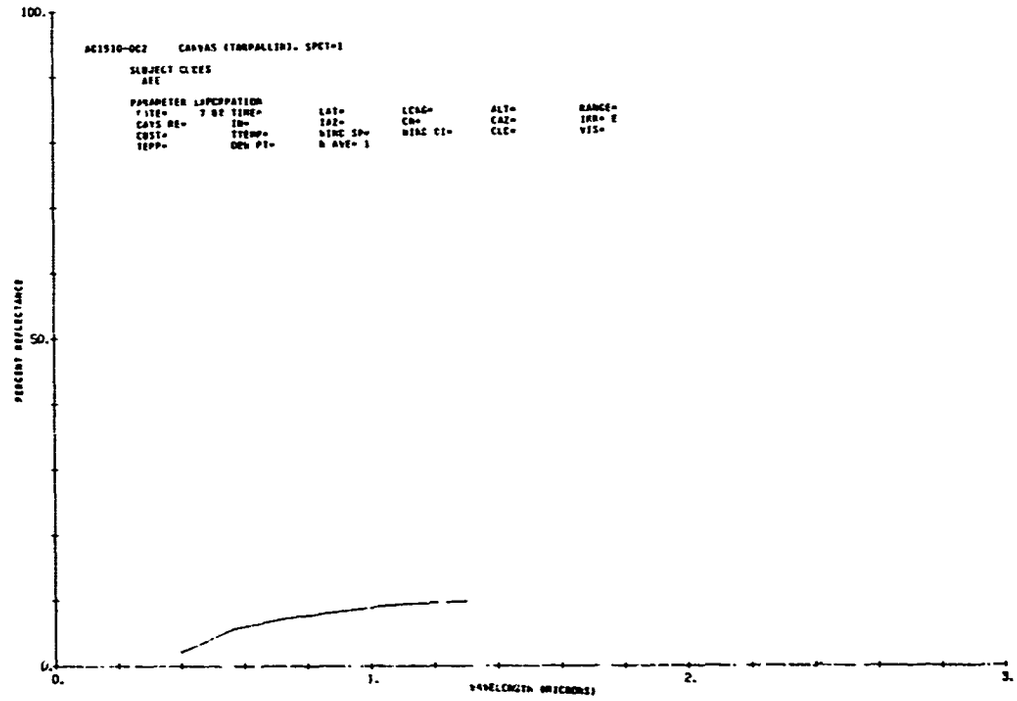
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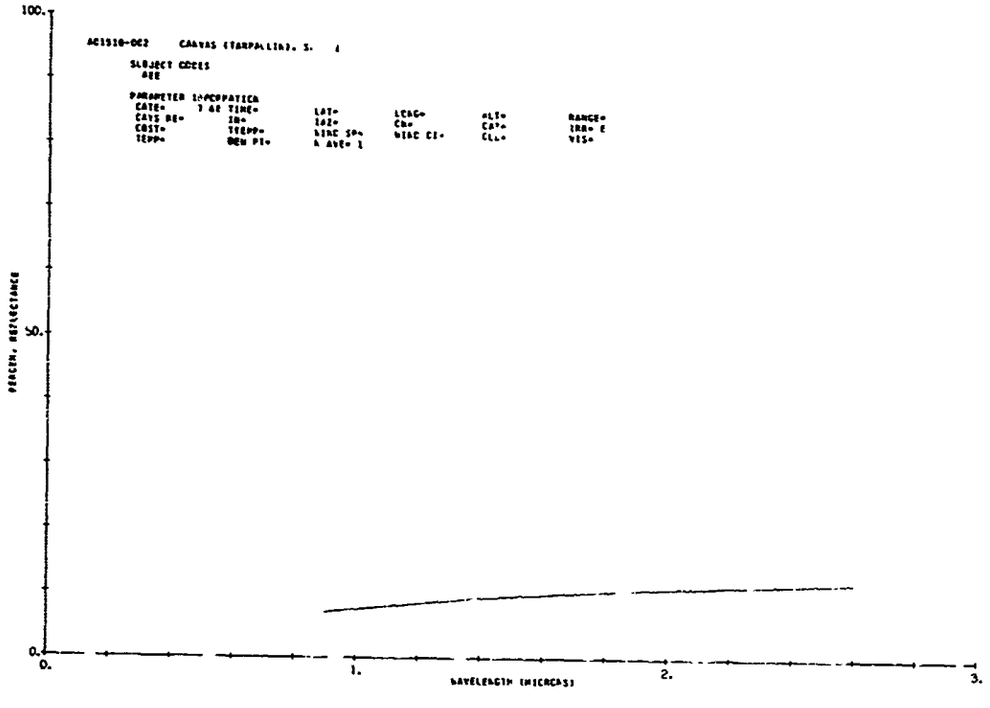
WAVELENGTH (MICRONS)



AG1510-0C2 CANVAS (TARPAULIN). S. 4

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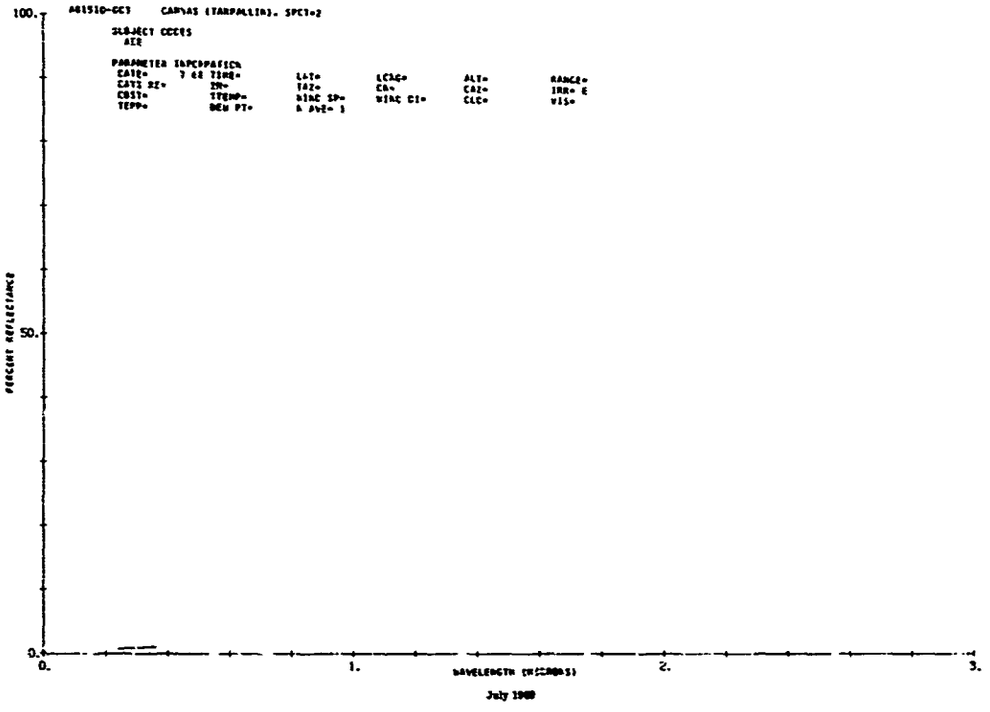

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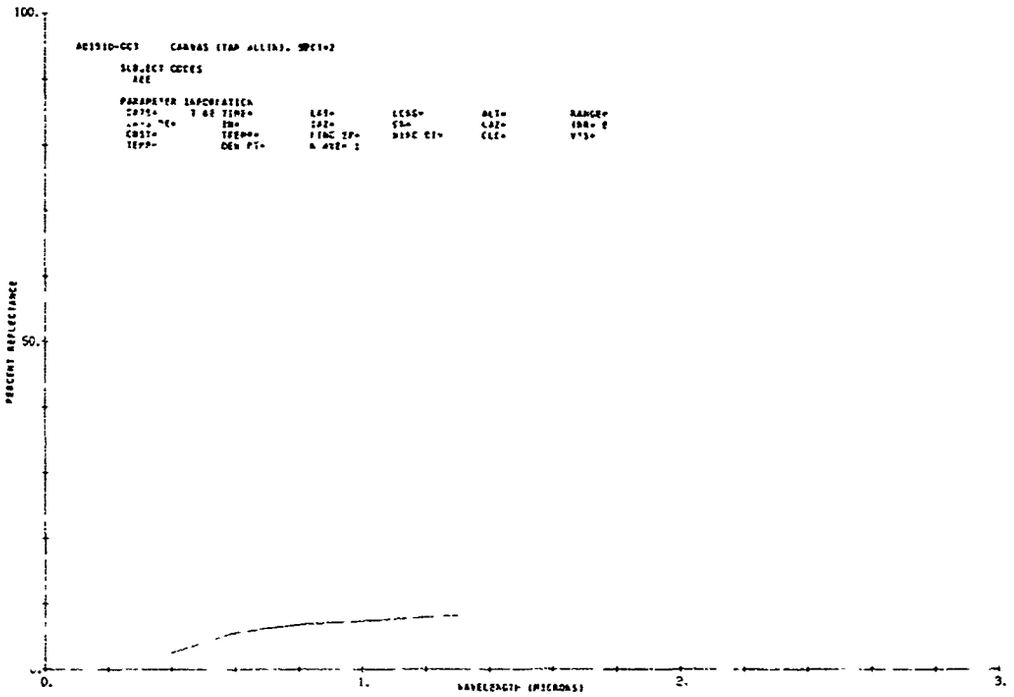
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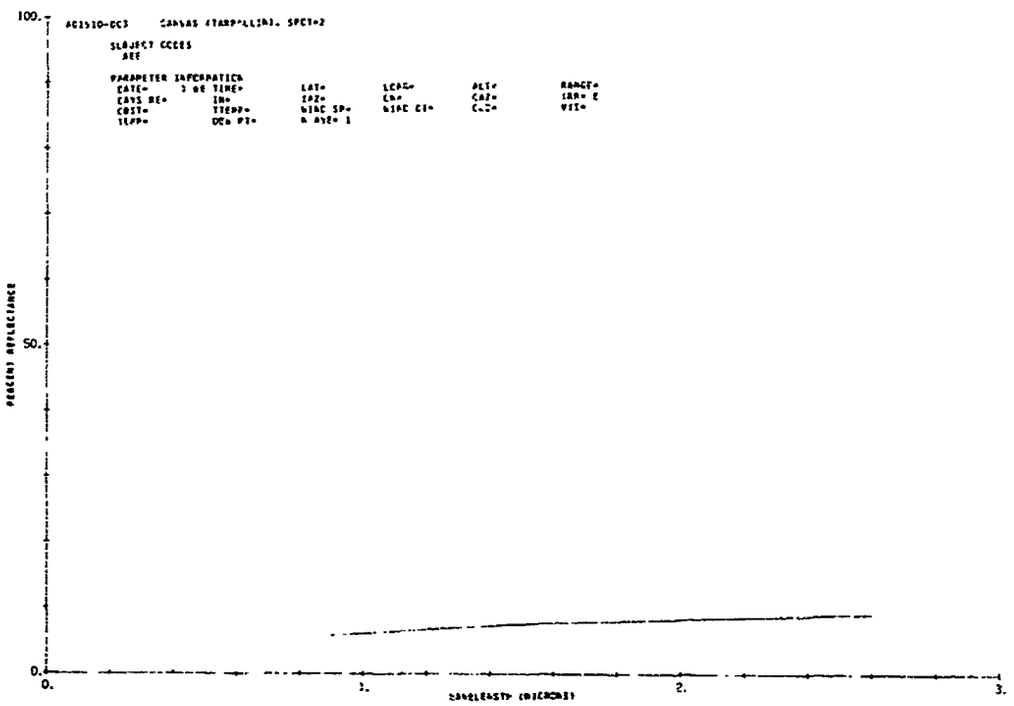
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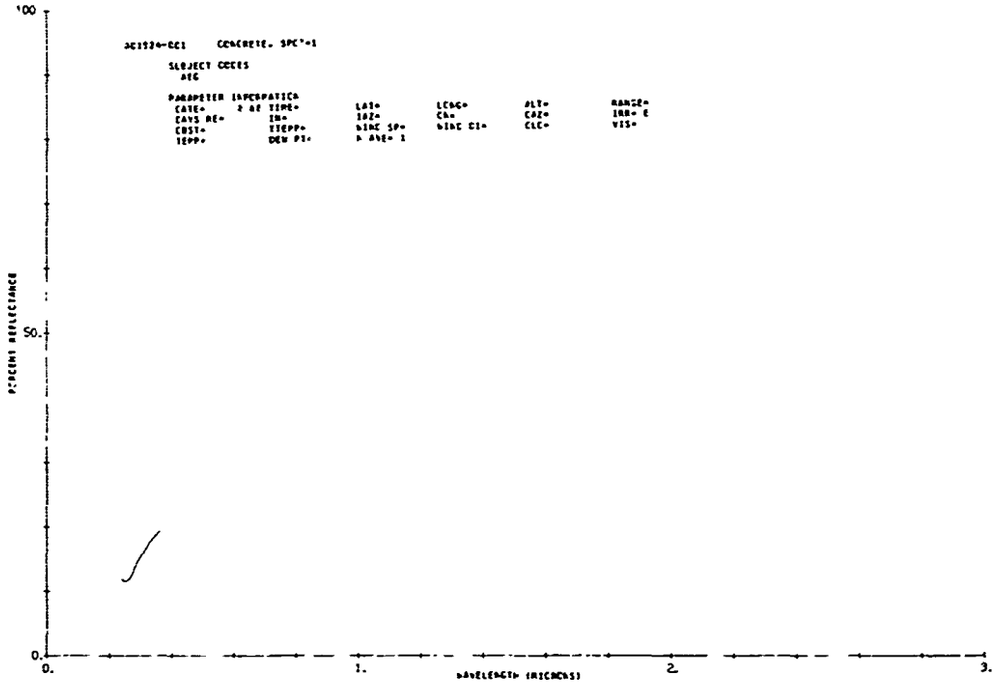
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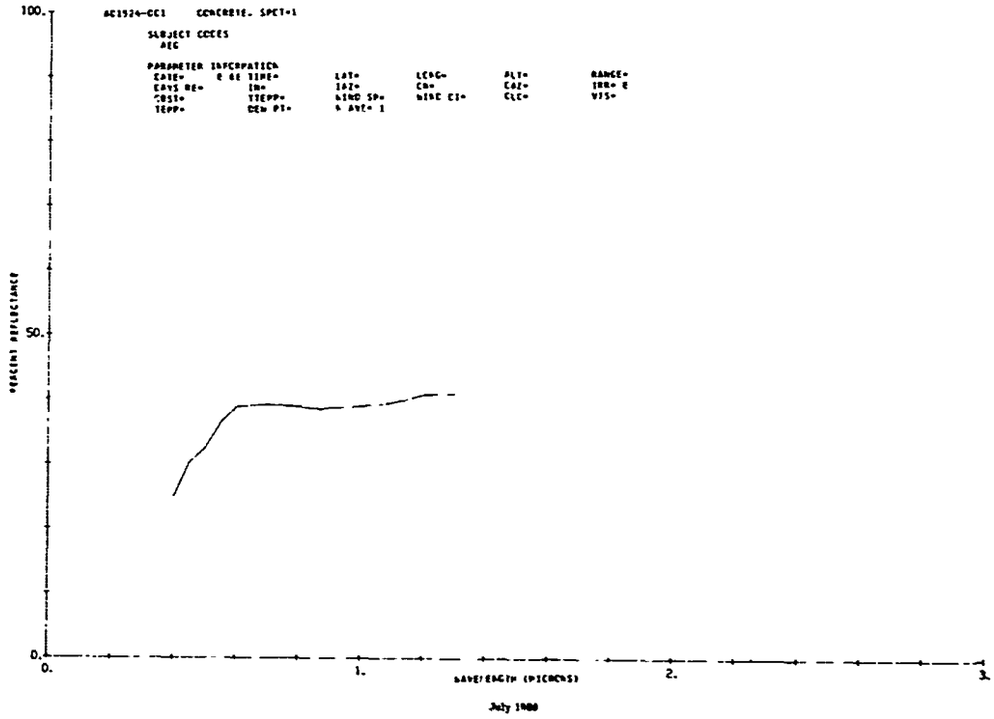
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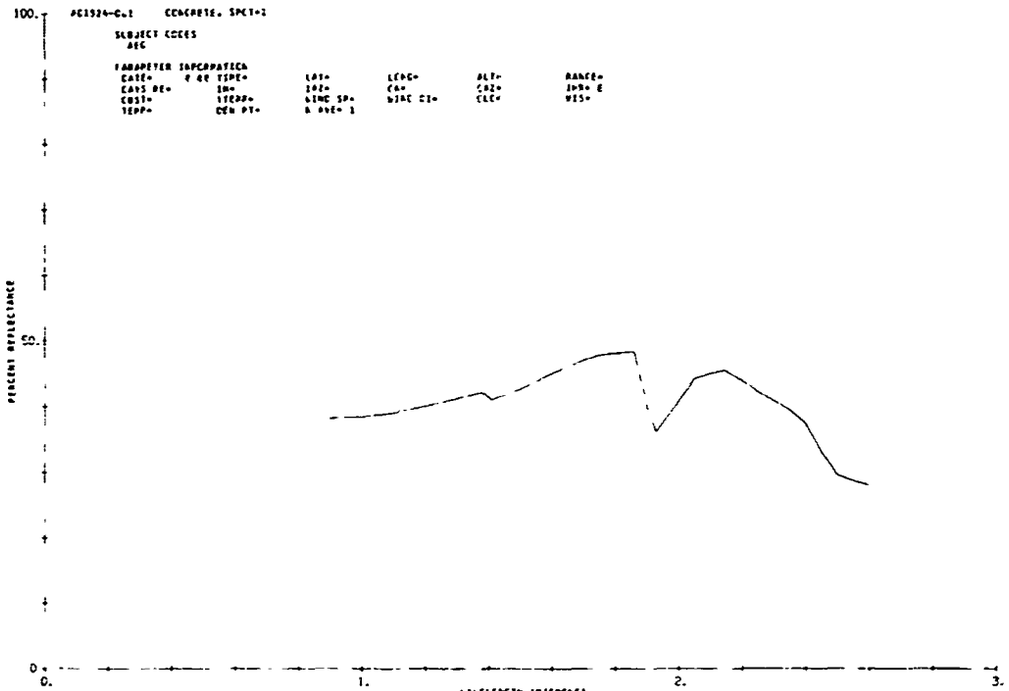
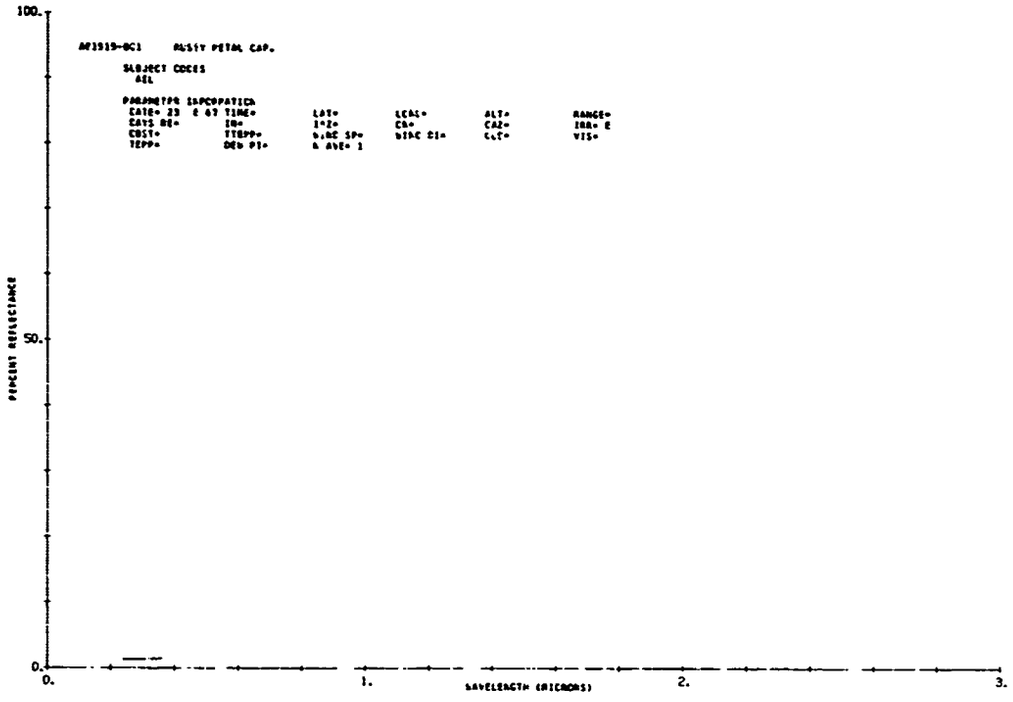


July 1968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TTCPP=
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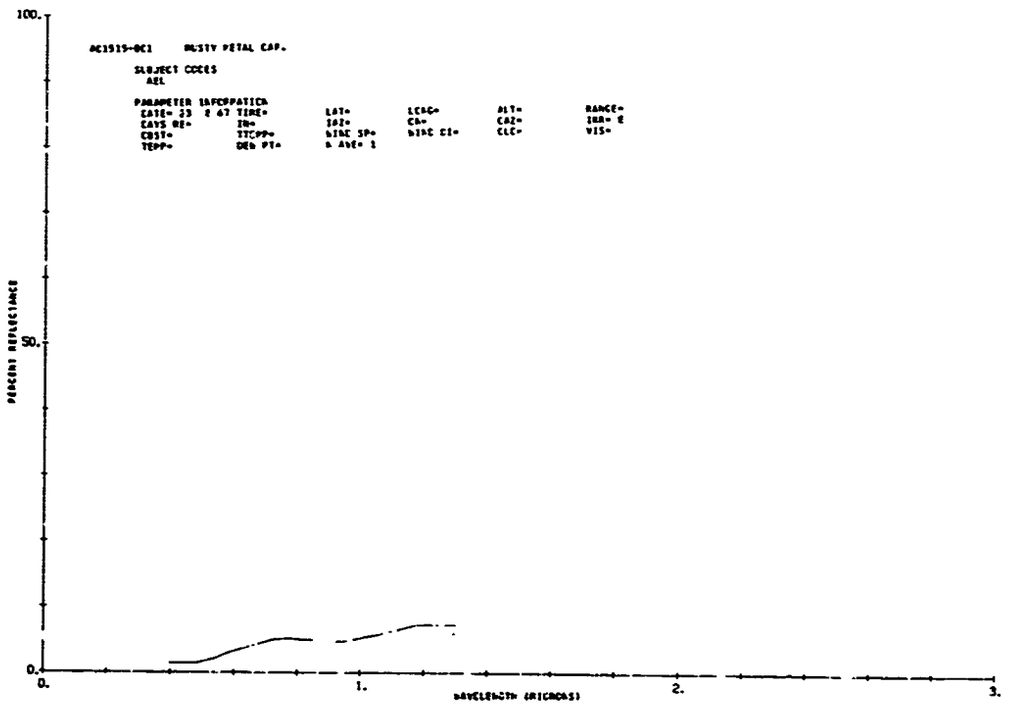
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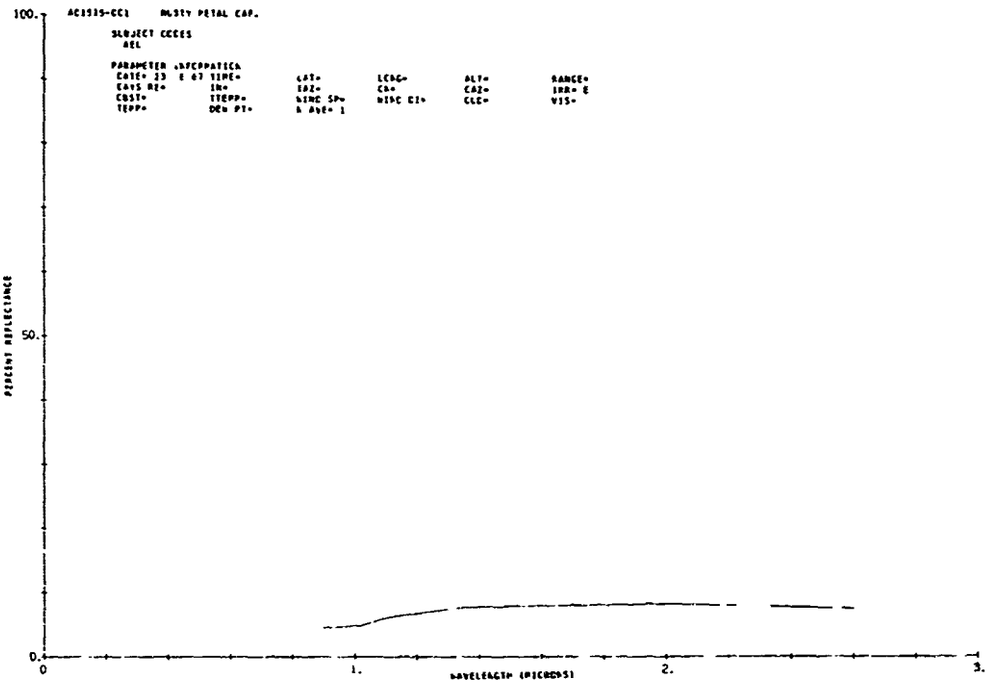
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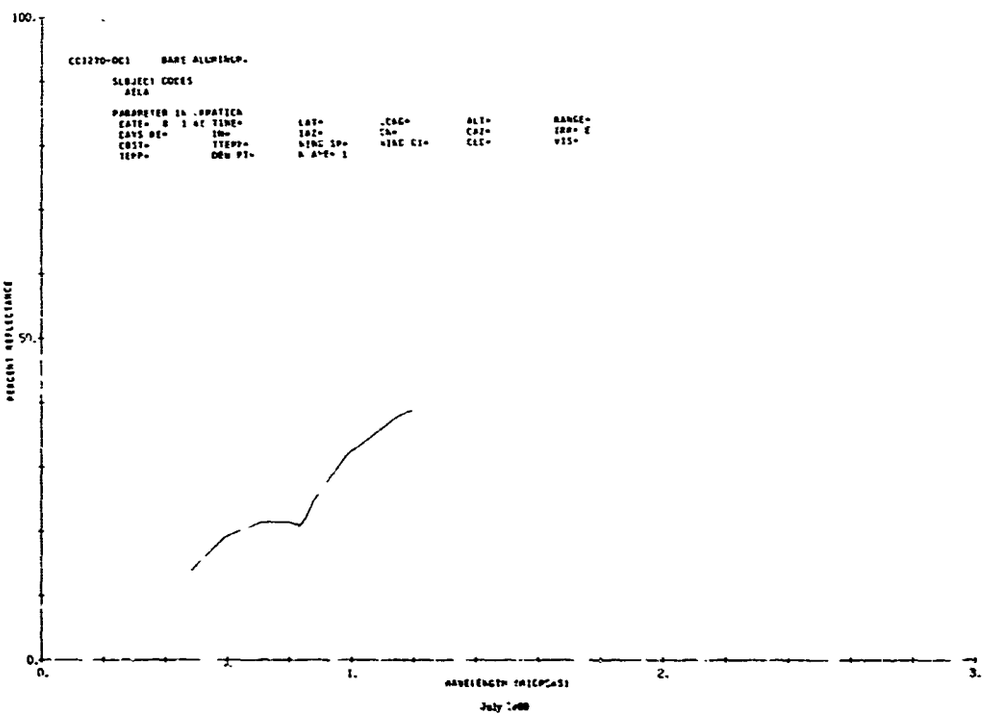
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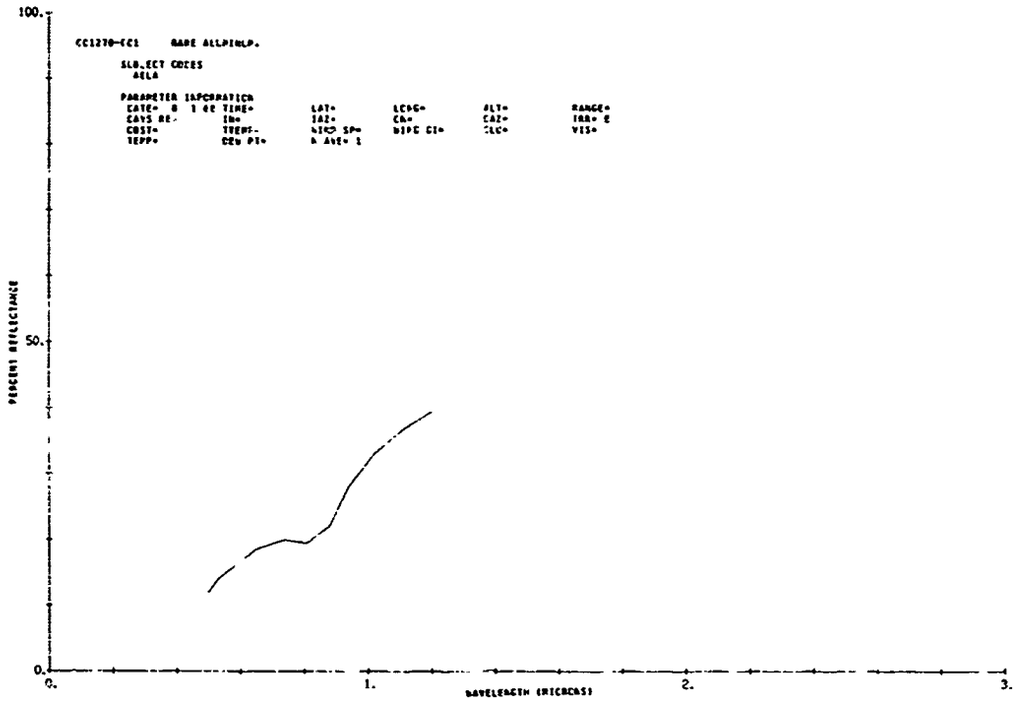
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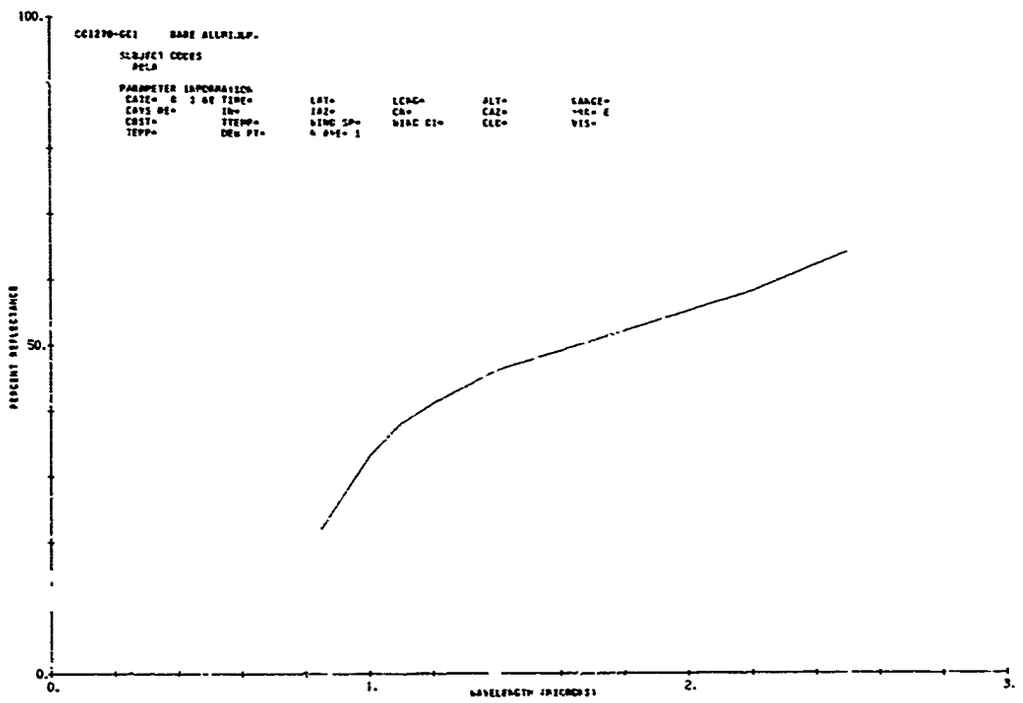
WAVELENGTH (MICRONS)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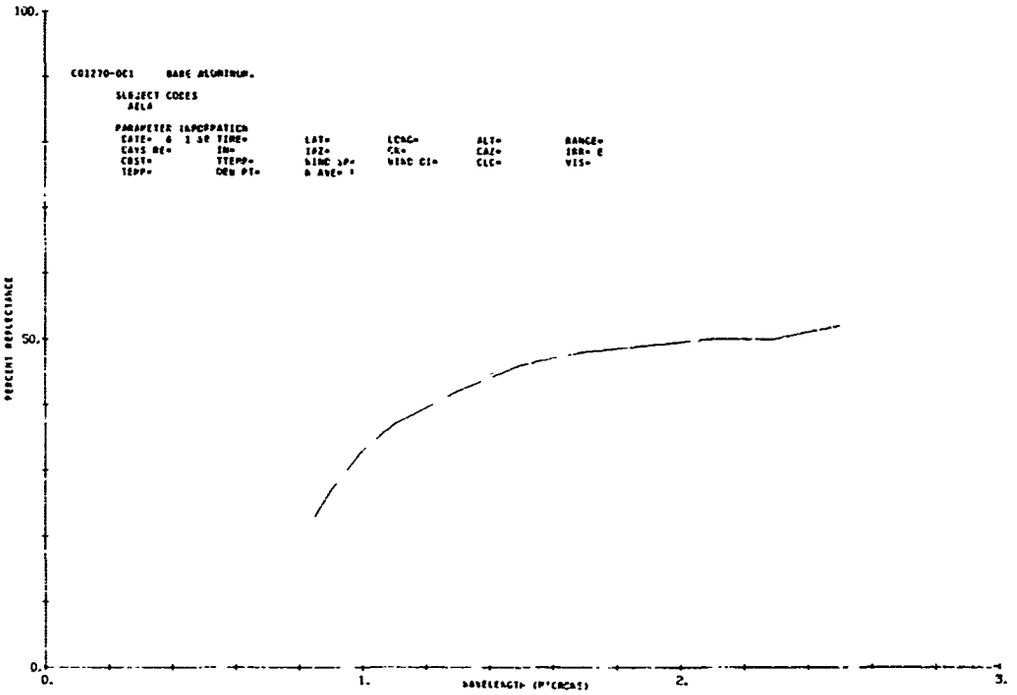
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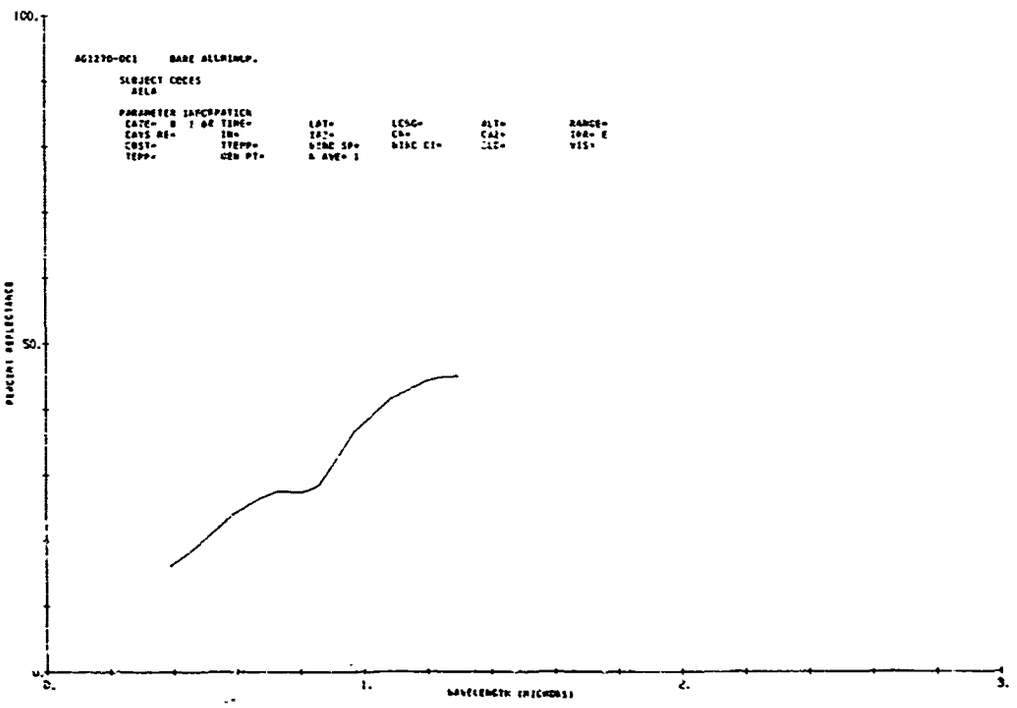
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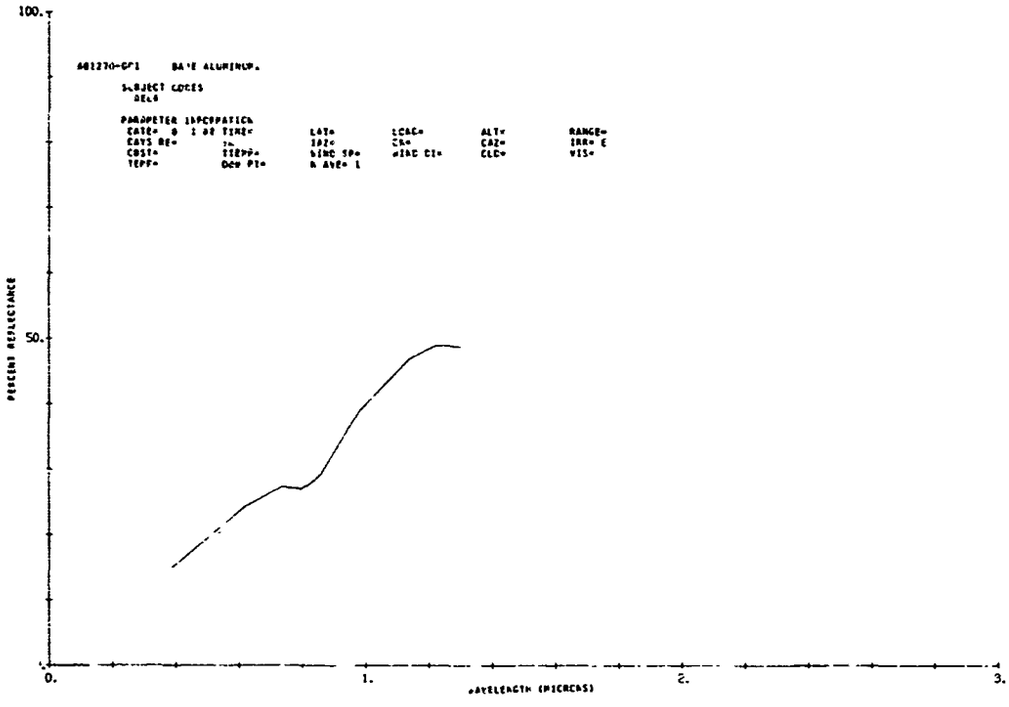
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AE1270-GP1 BARE ALUMINUM.
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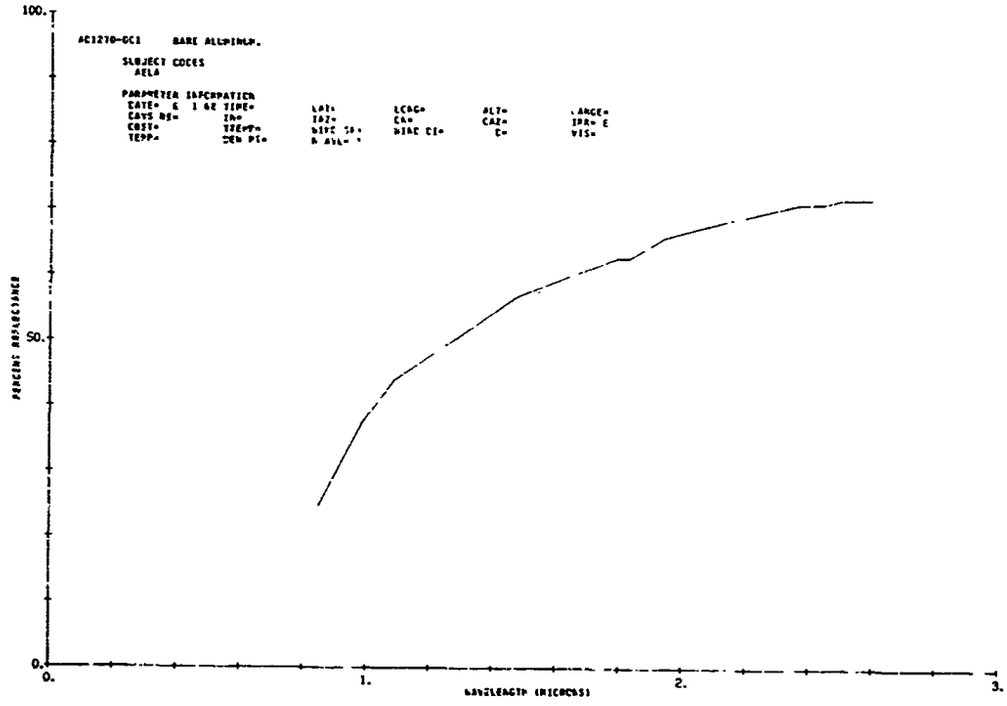
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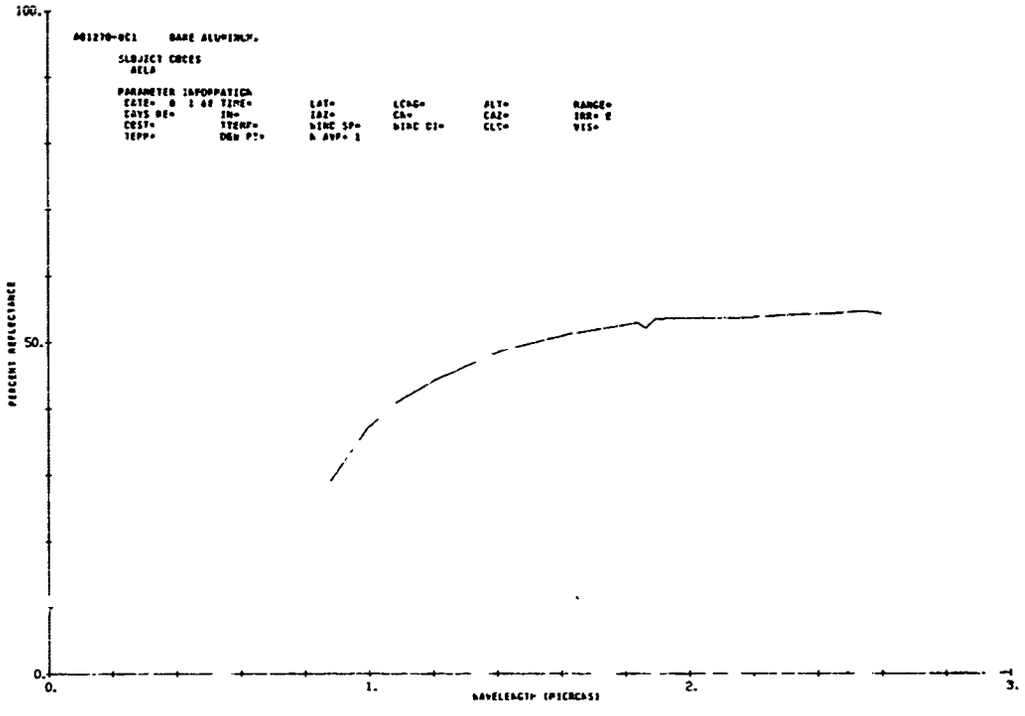
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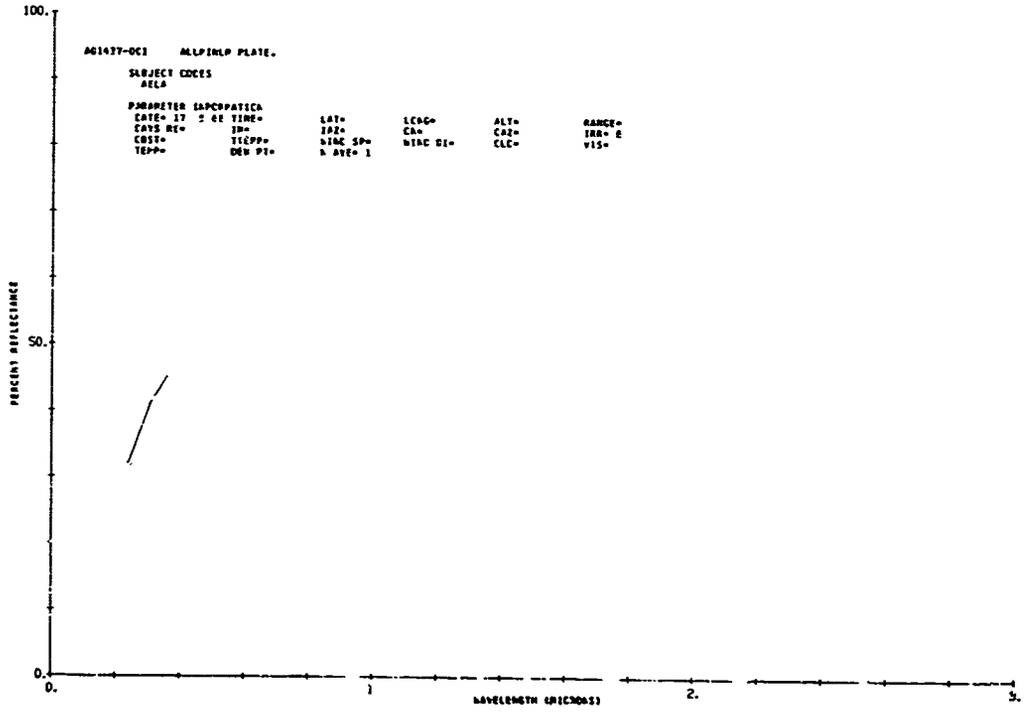
WAVELENGTH (MICRONS)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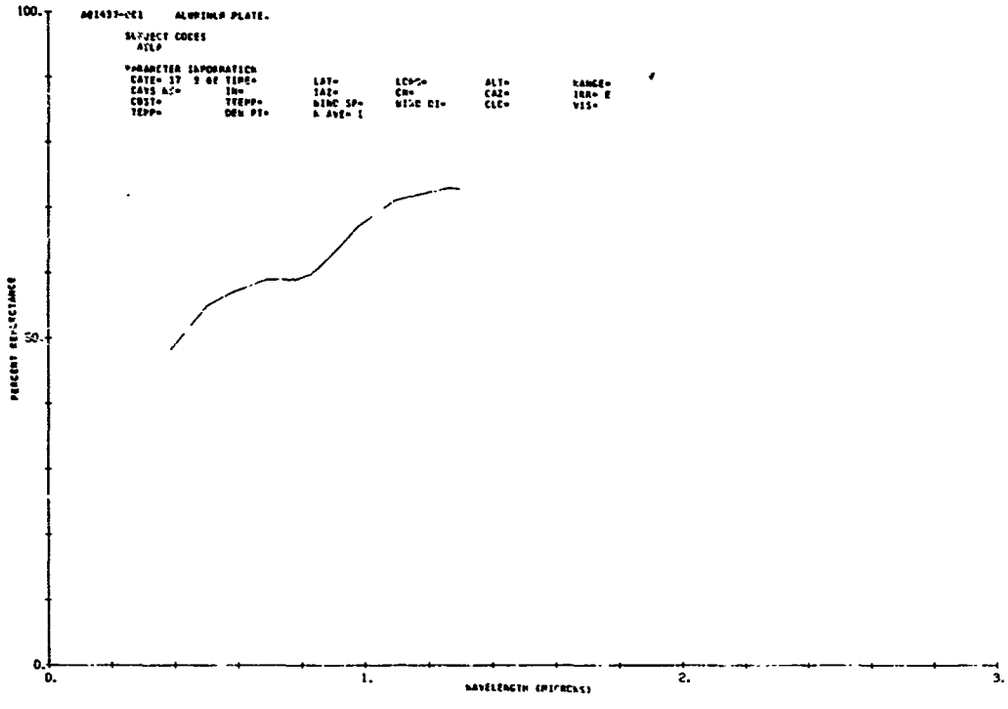
WAVELENGTH (MICRONS)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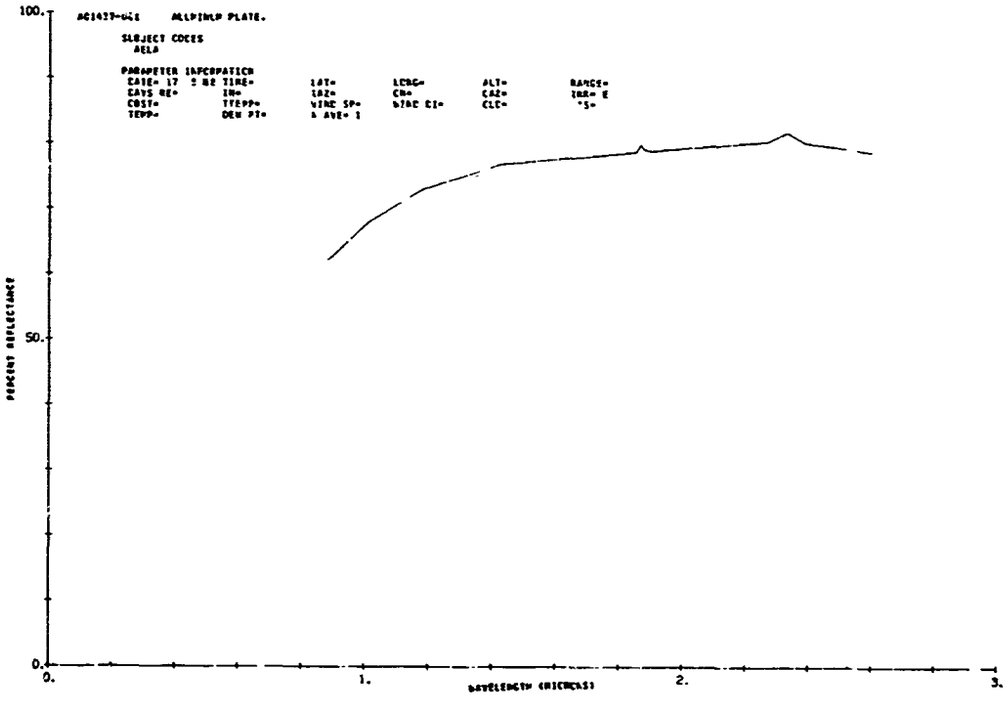
WAVELENGTH (MICRONS)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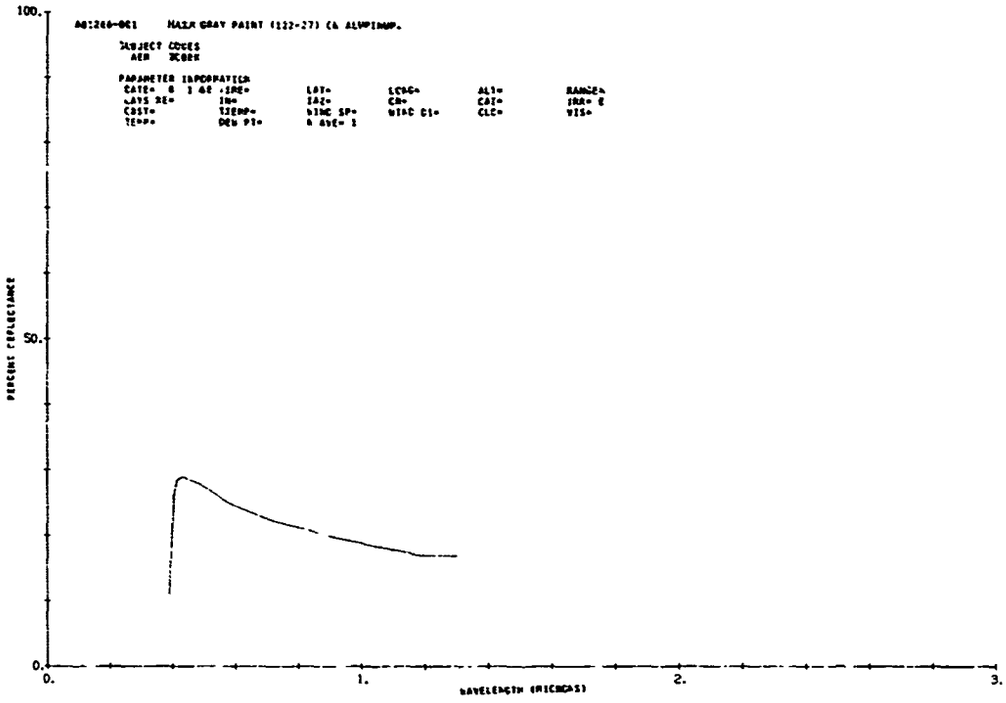
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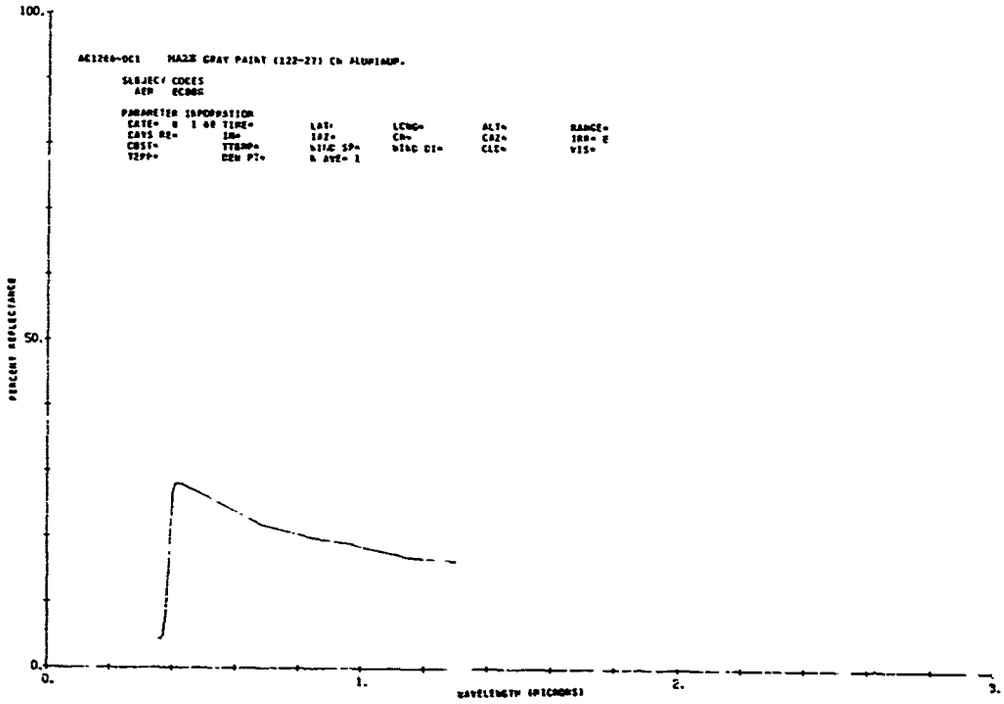
WAVELENGTH (MICRONS)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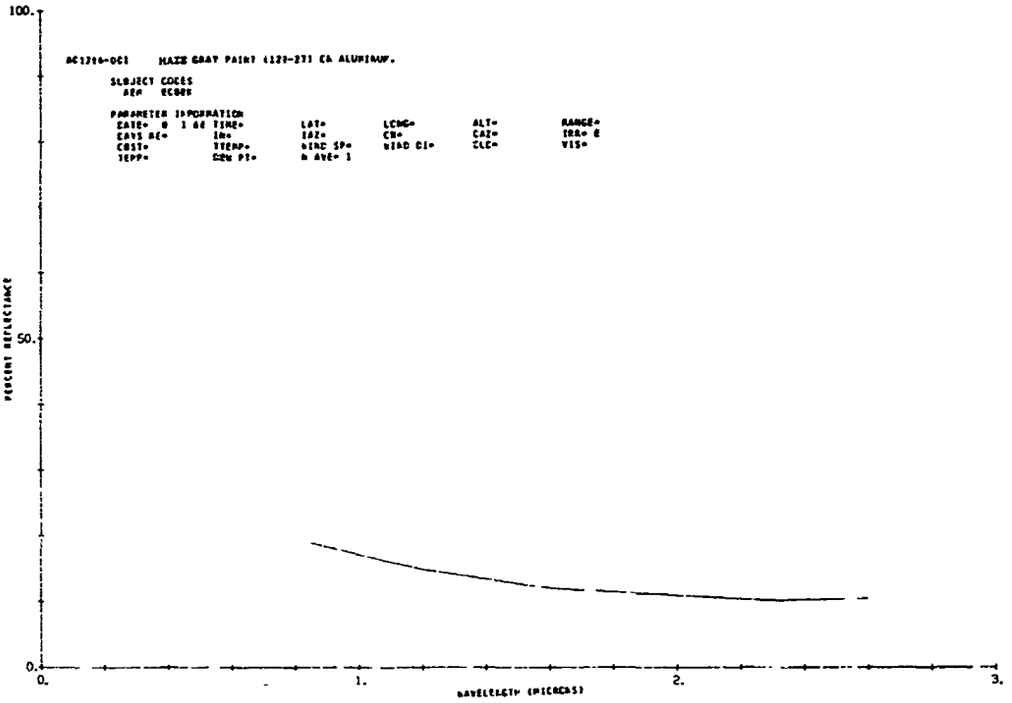
WAVELENGTH (MICRONS)



AC1224-0C1 HAZE GRAY PAINT (122-27) CA ALUMINUM.

SUBJECT CODES
AEP EC09R

PARAMETER INFORMATION
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COST= TTEMP= WIND SP= WIND DI= CLE= VIS=
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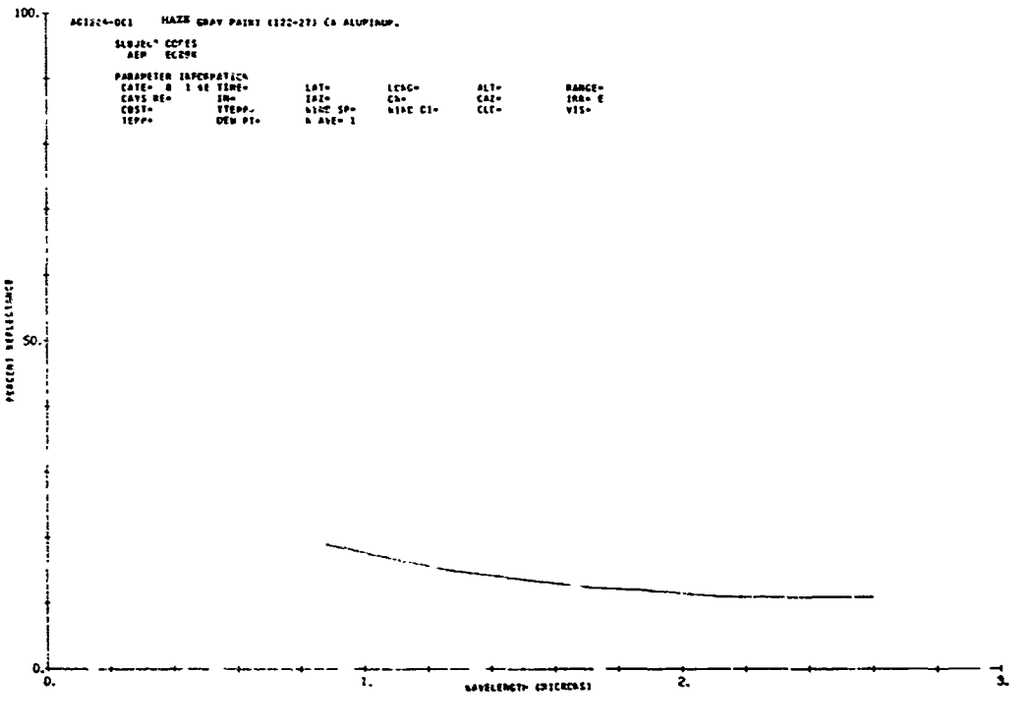

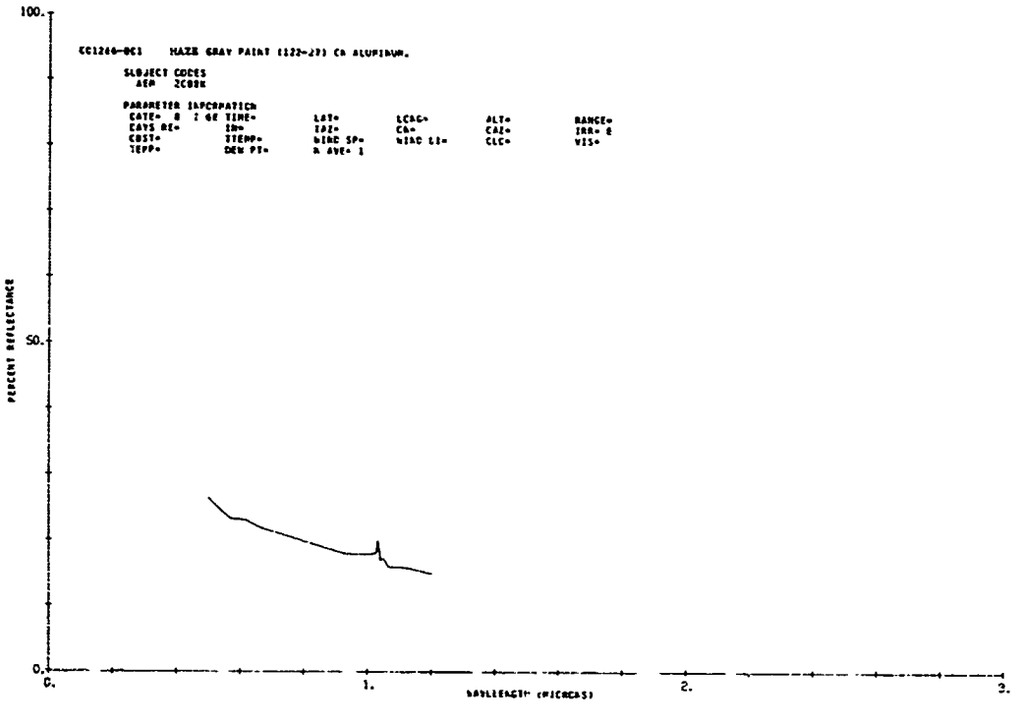
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CC1266-0C1 HAZE GRAY PAINT (122-27) ON ALUMINUM.
SUBJECT CODES
AEP 2C08K
PARAMETER INFORMATION
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DAYS RE= IR= IAZ= ON= CAZ= IRR= E
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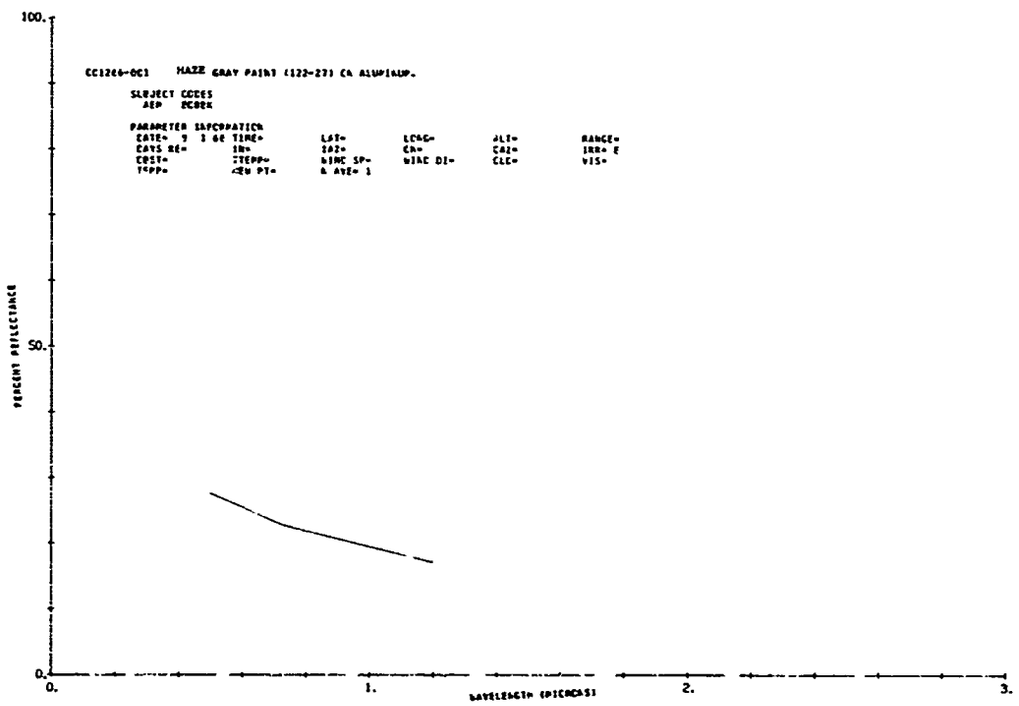
WAVELENGTH (MICRONS)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SUBJECT CODES
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DAYS RE= IR= IAZ= ON= CAZ= IRR= E
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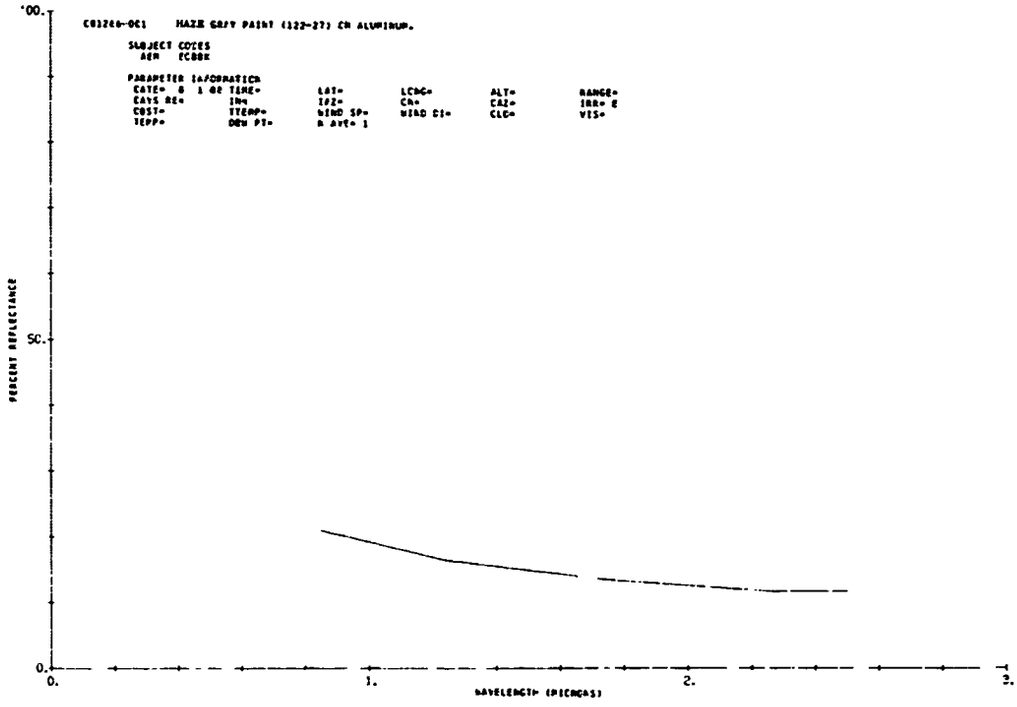
WAVELENGTH (MICRONS)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SUBJECT CODES
AEM ECBBK
PARAMETER INFORMATION
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CAYS RE= IN= TAZ= CN= CAZ= IRR= E
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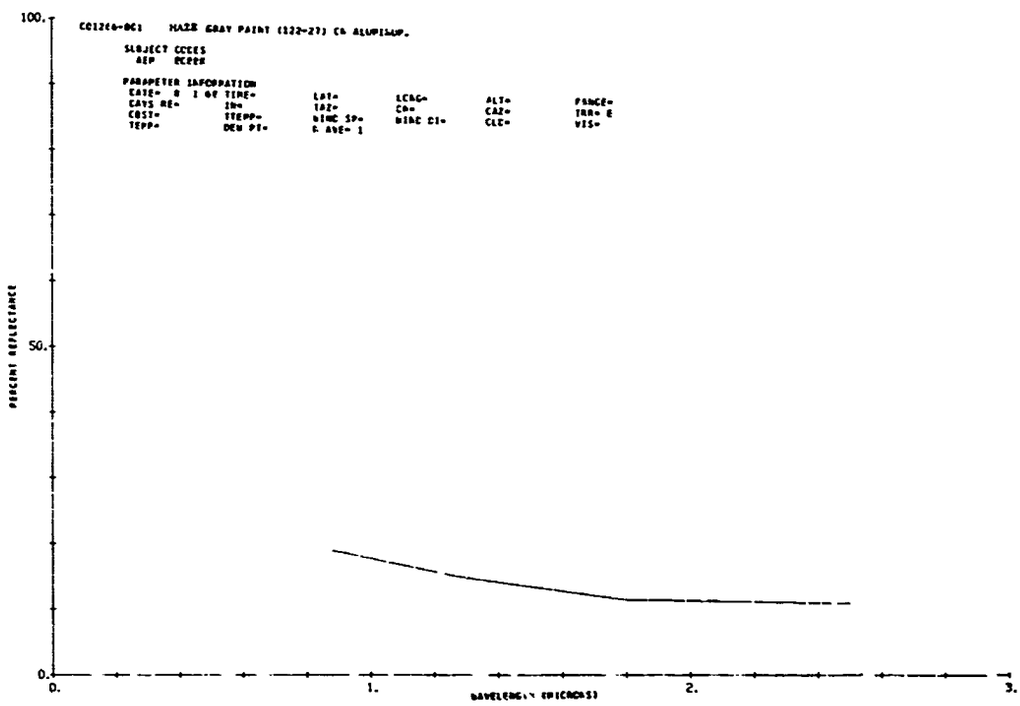
WAVELENGTH (MICRONS)


C01266-0C1 HAZE GRAY PAINT (122-27) ON ALUMINUM.
SUBJECT CODES
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PARAMETER INFORMATION
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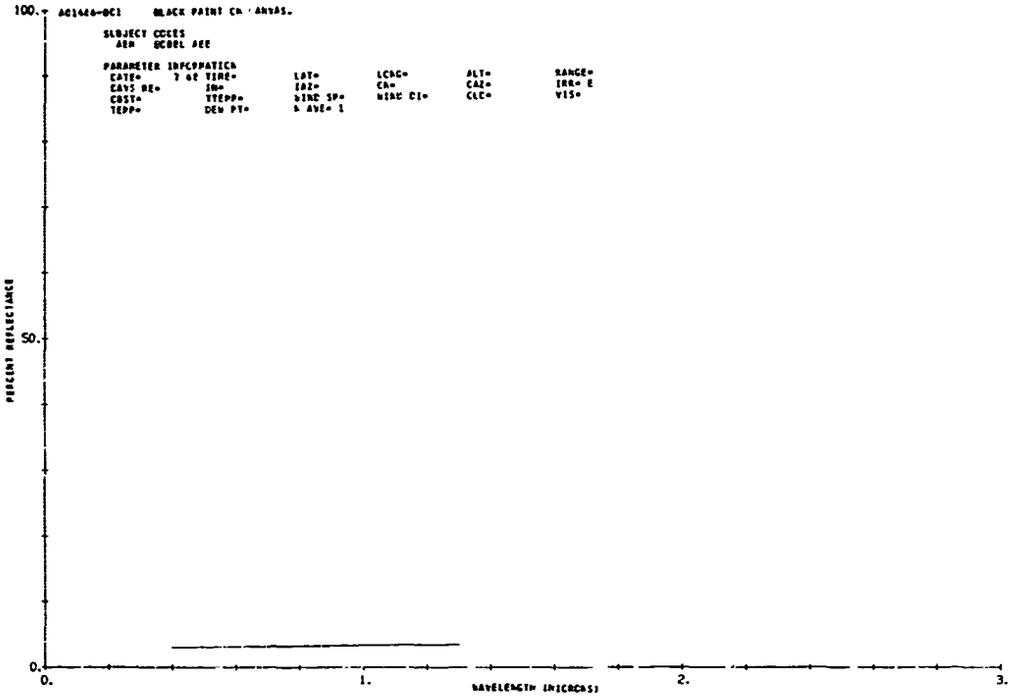
WAVELENGTH (MICRONS)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AC1464-0C1 BLACK PAINT ON CANVAS.
SUBJECT CODES
AEM ECOEL AEE
PARAMETER INFORMATION
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COST= TEMP= WIND SP= WIND DI= CLC= VIS=
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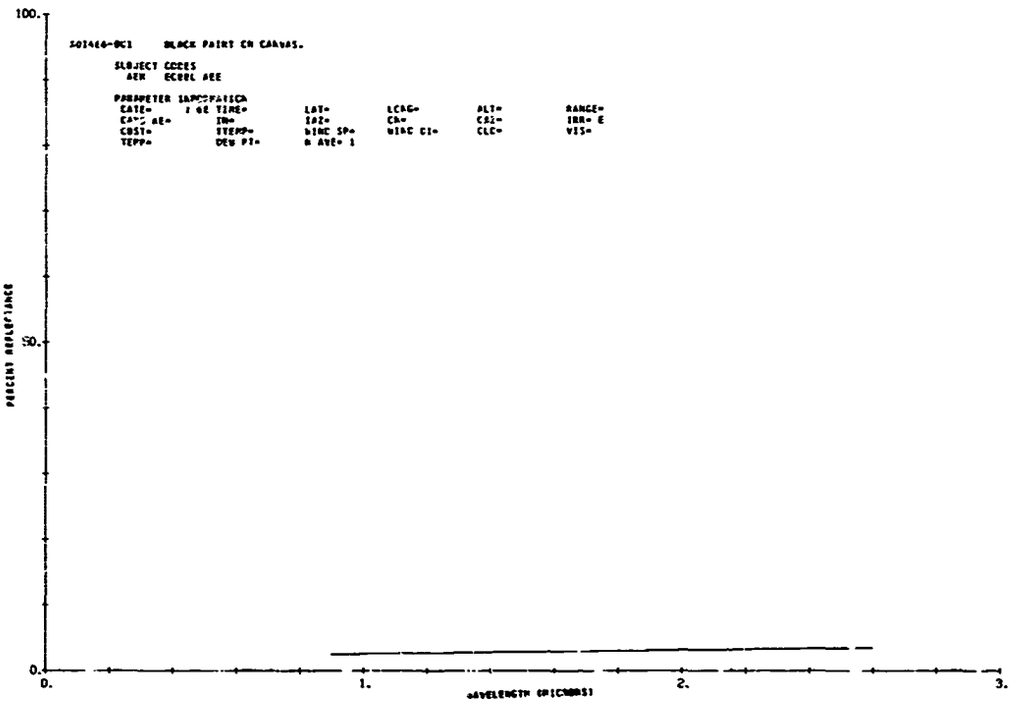
WAVELENGTH (MICRONS)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SUBJECT CODES
AEM ECOEL AEE
PARAMETER INFORMATION
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COST= TEMP= WIND SP= WIND DI= CLC= VIS=
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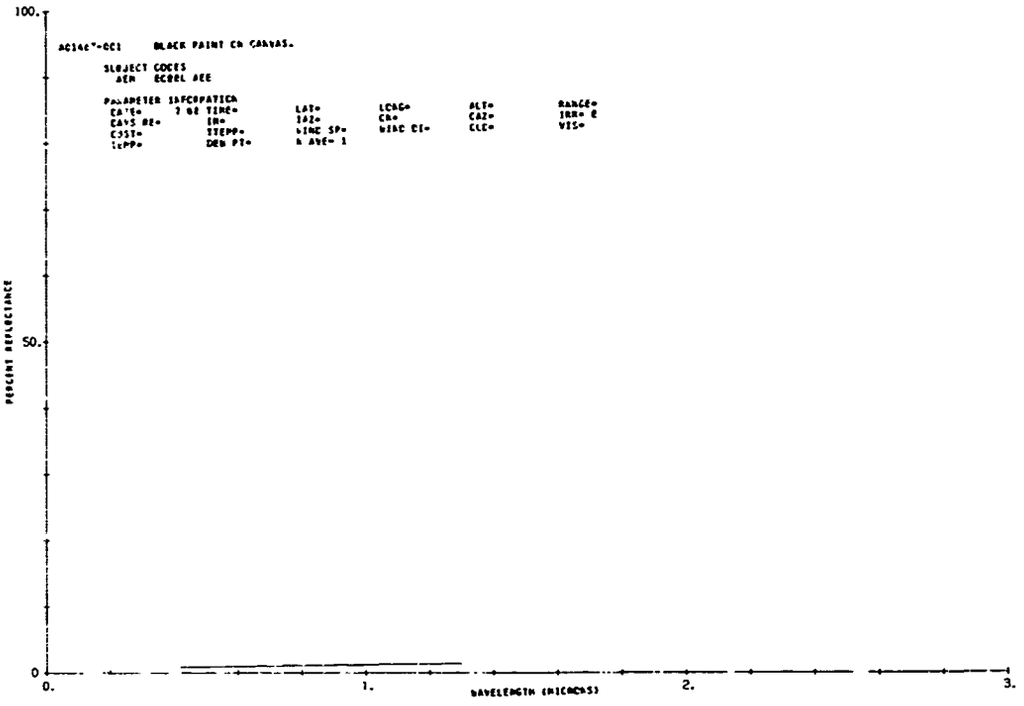
WAVELENGTH (MICRONS)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PERCENT REFLECTANCE
WAVELENGTH (MICRONS)
AC14C*-0C1 BLACK PAINT ON CANVAS.
SUBJECT CODES
AEM ECORL AEE
PARAMETER INFORMATION
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COST= TEMP=
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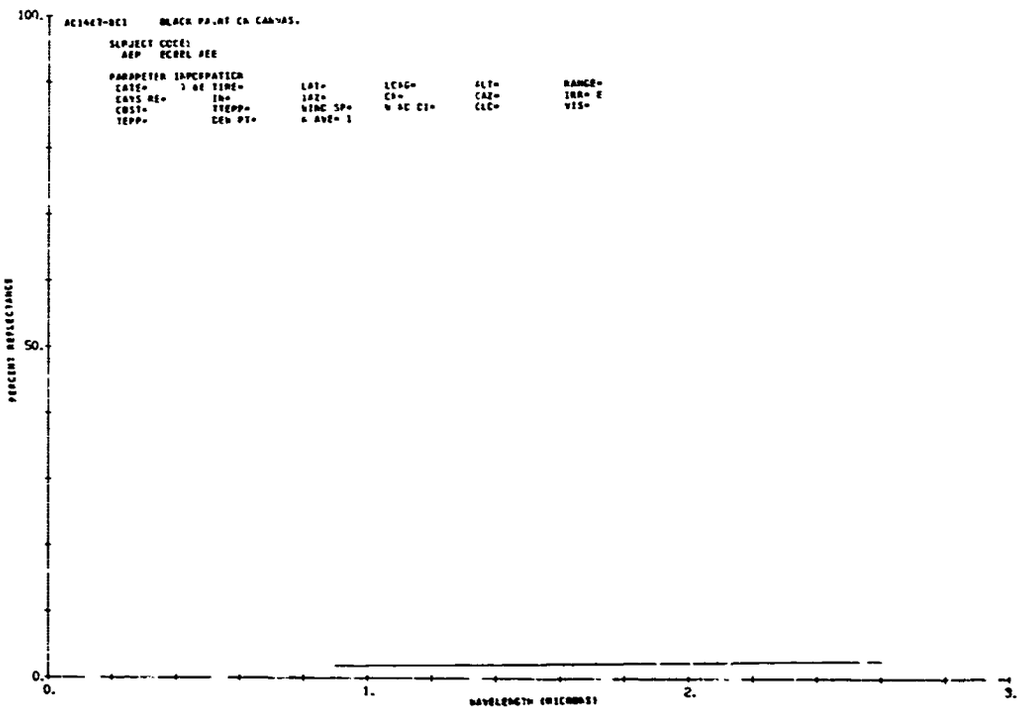
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PERCENT REFLECTANCE
WAVELENGTH (MICRONS)
AC14C7-0C1 BLACK PAINT ON CANVAS.
SUBJECT CODES
AEM ECORL AEE
PARAMETER INFORMATION
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COST= TEMP=
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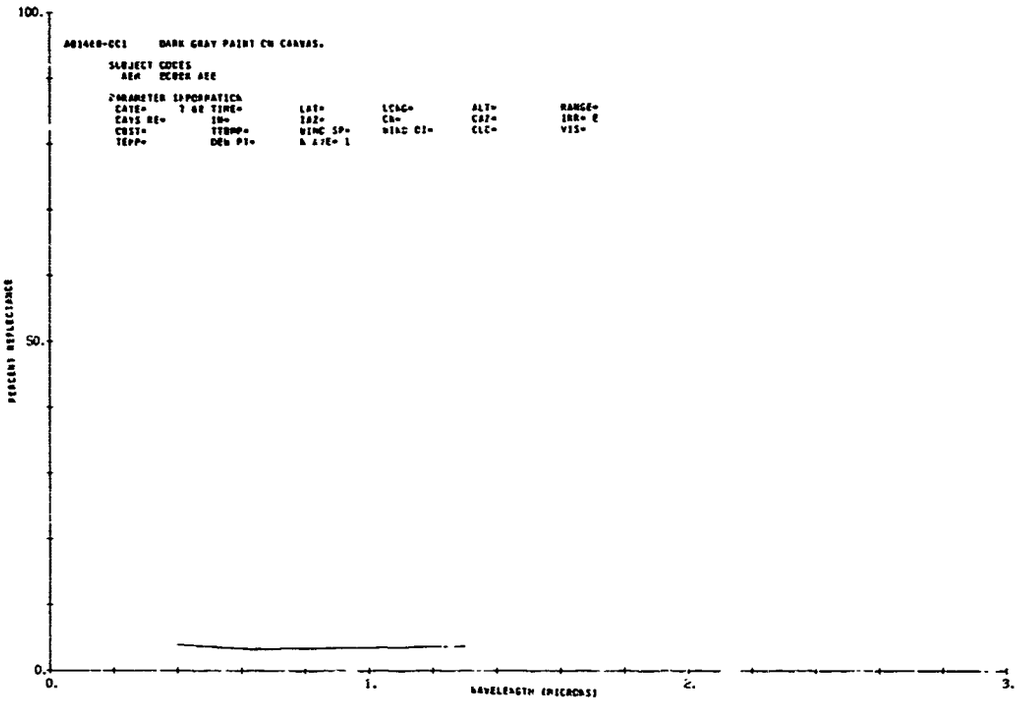
AG1468-CC1 DARK GRAY PAINT ON CANVAS.
SUBJECT CODES
AEM OCDEN AEE
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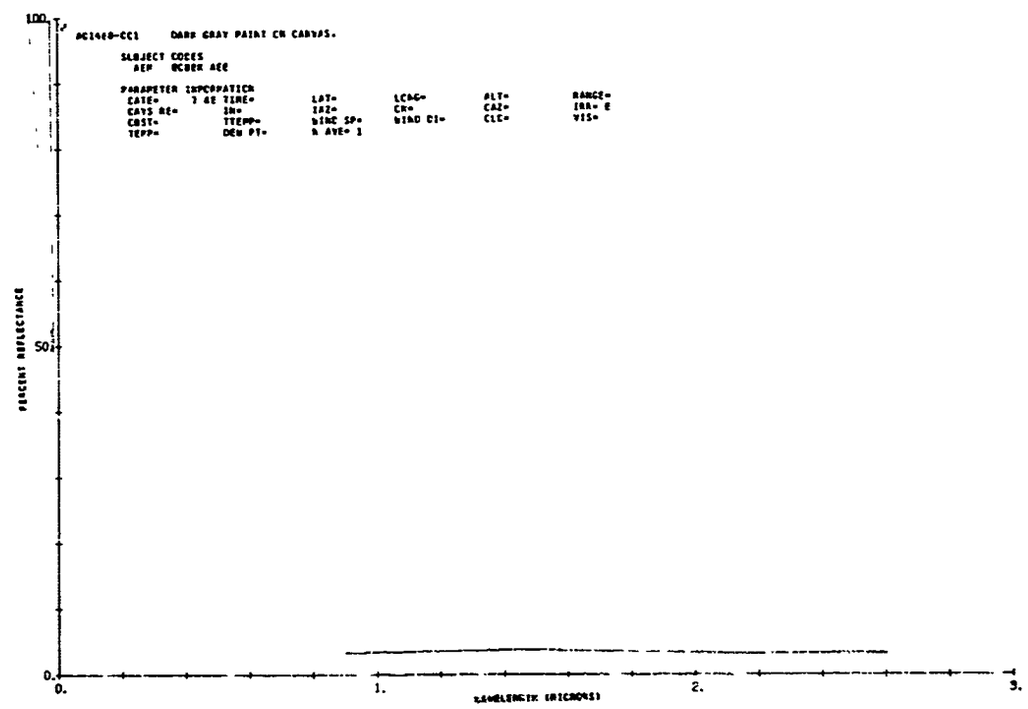
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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SUBJECT CODES
AEM OCDEN AEE
PARAMETER INFORMATION
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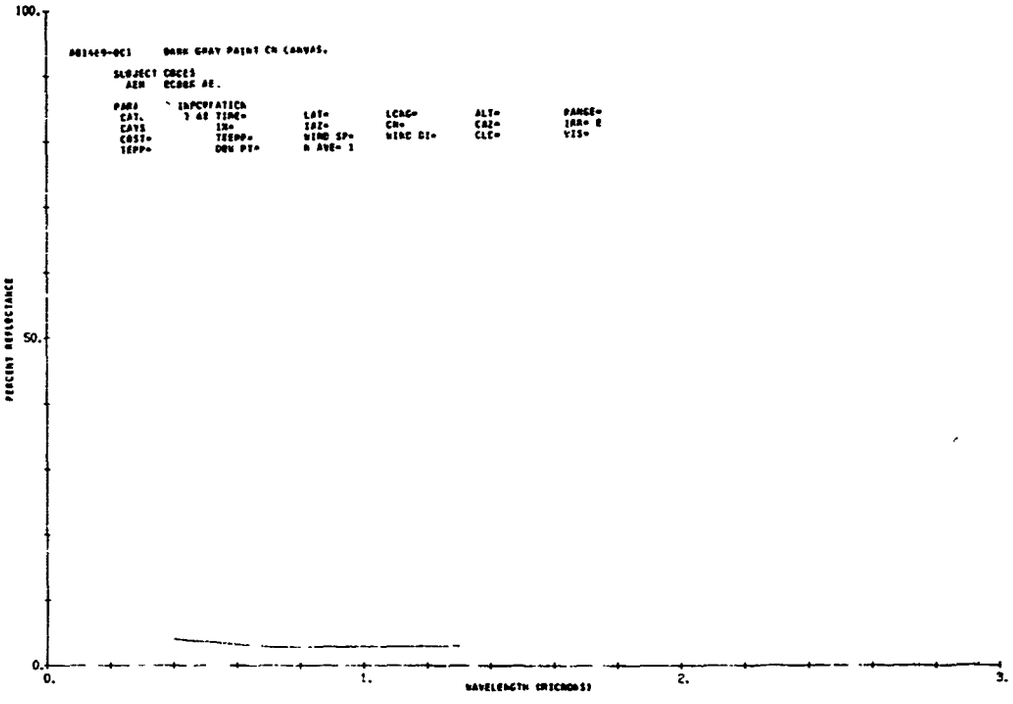
WAVELENGTH (MICRONS)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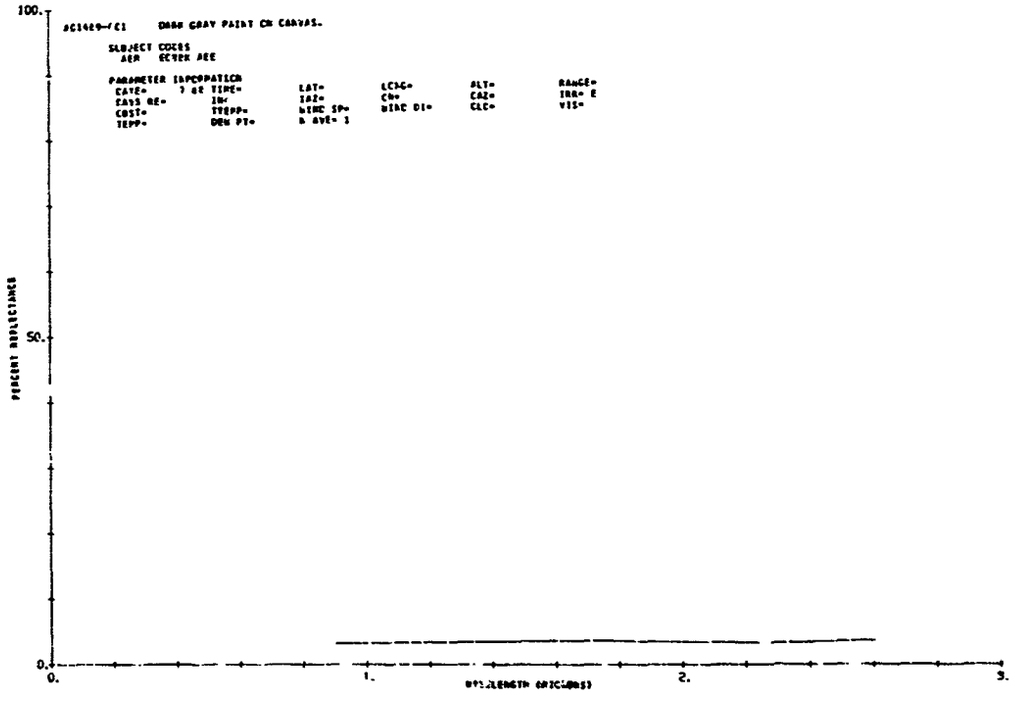
WAVELENGTH (MICRONS)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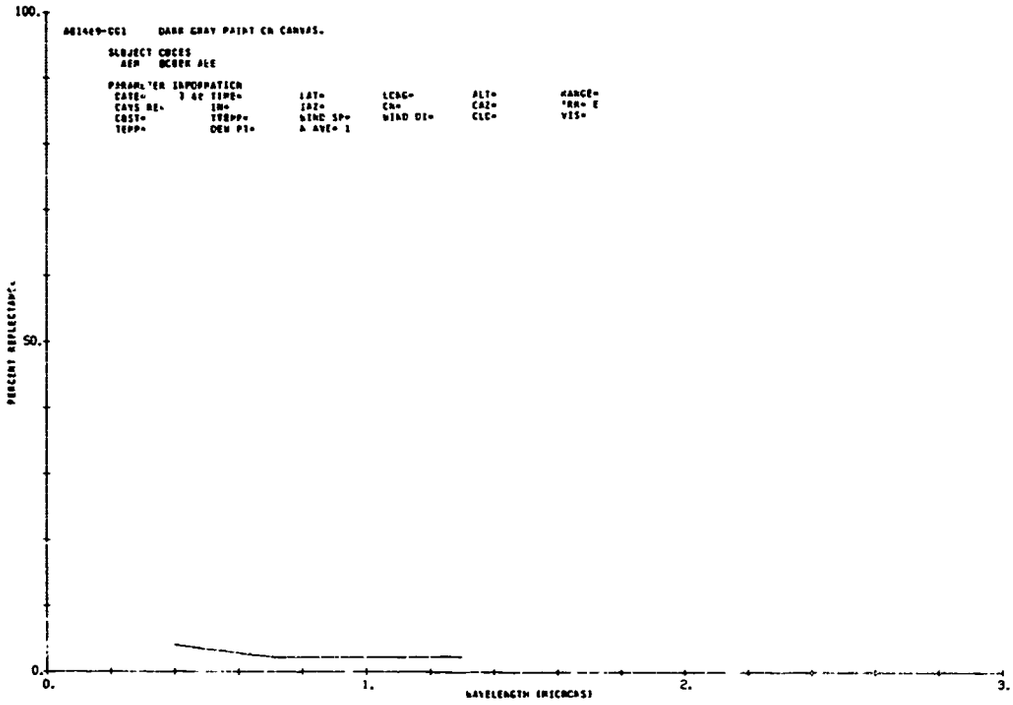
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AE1469-CC1 DARK GRAY PAINT ON CANVAS.
SUBJECT CODES
AEP ECORK AEE
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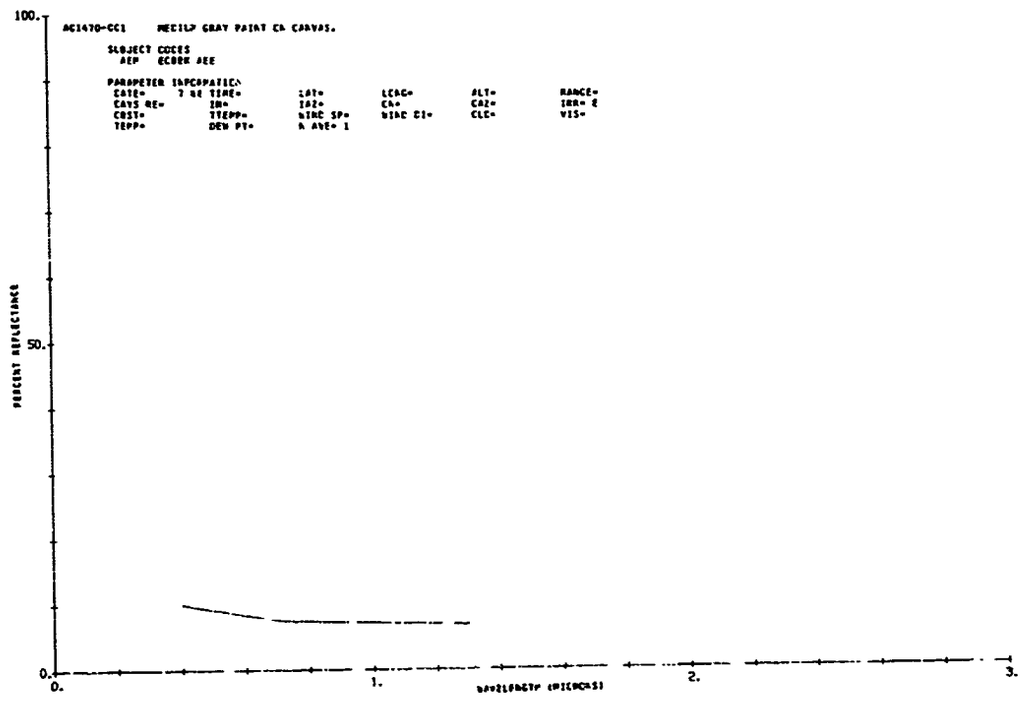
WAVELENGTH (MICRONS)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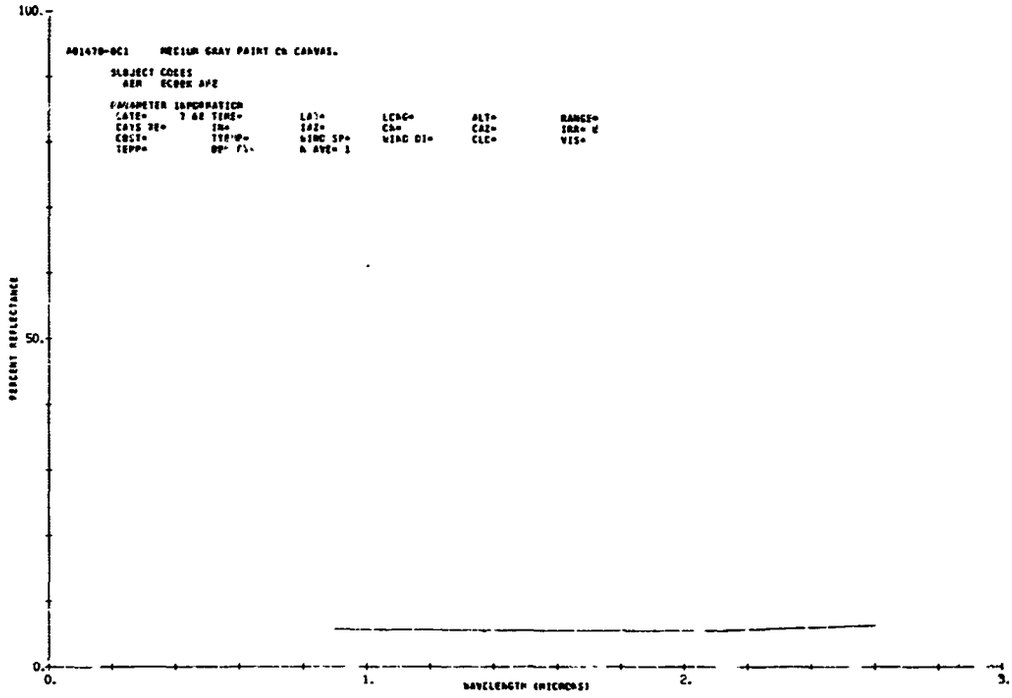
WAVELENGTH (MICRONS)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SUBJECT CODES
AER ECOBK AFE
PARAMETER INFORMATION
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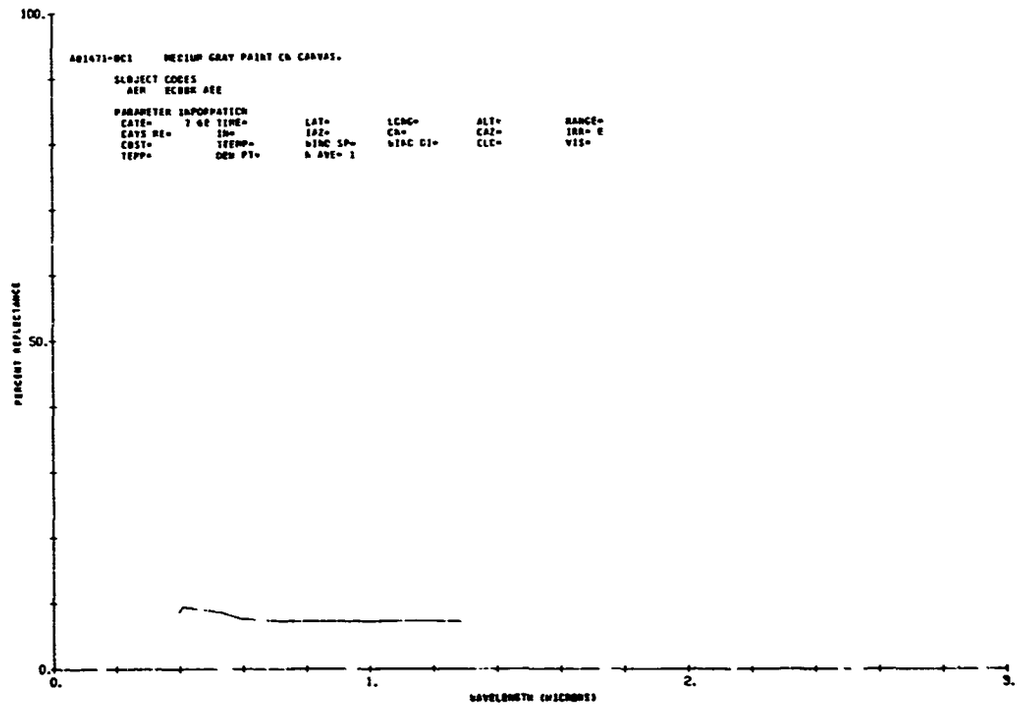
WAVELENGTH (MICRONS)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SUBJECT CODES
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PARAMETER INFORMATION
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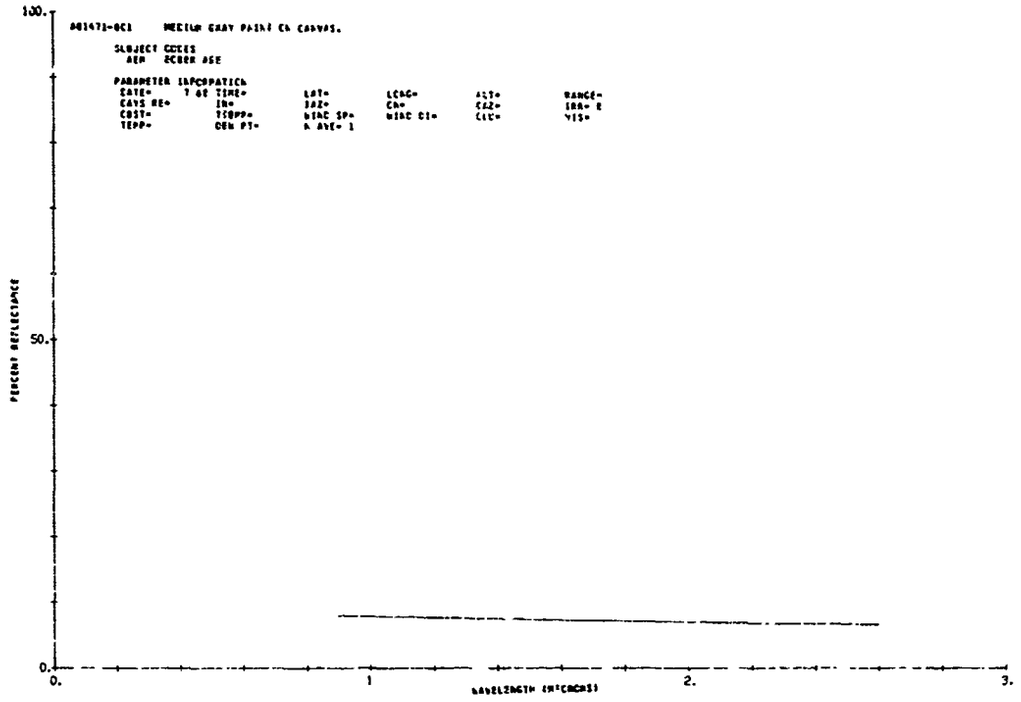
WAVELENGTH (MICRONS)


A01471-0C1 MEDIUM GRAY PAINT ON CANVAS.
SUBJECT CODES
AEM ECBEK AEE
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DAYS RE= IN= IAZ= CN= CAZ= IRR= E
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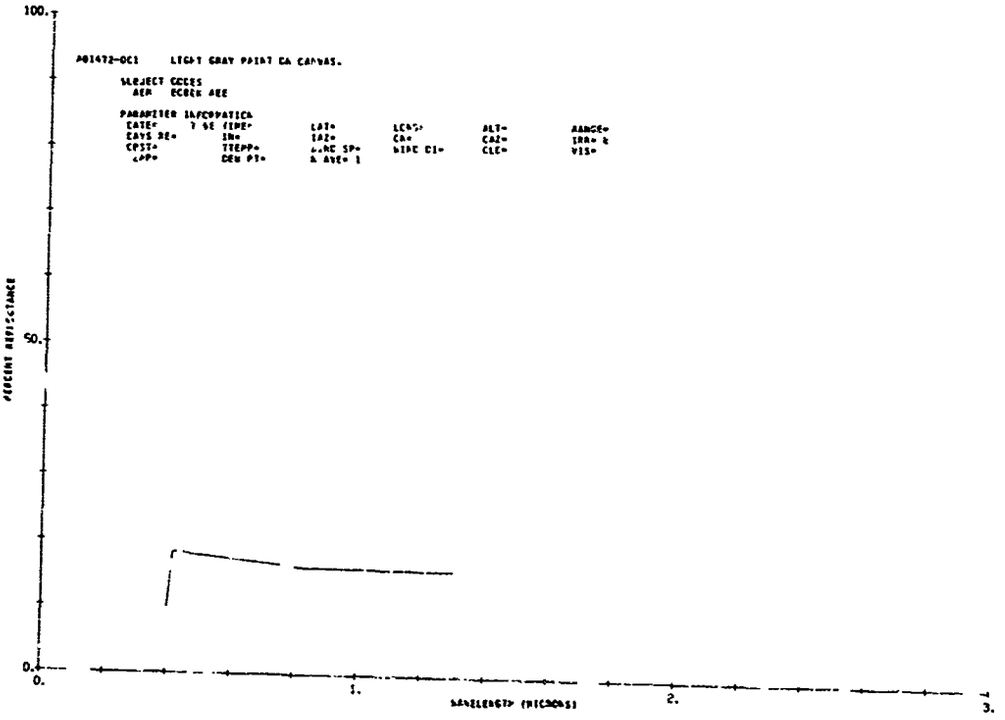
WAVELENGTH (MICRONS)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SUBJECT CODES
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PARAMETER INFORMATION
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DAYS RE= IN= IAZ= CN= CAZ= IRR= E
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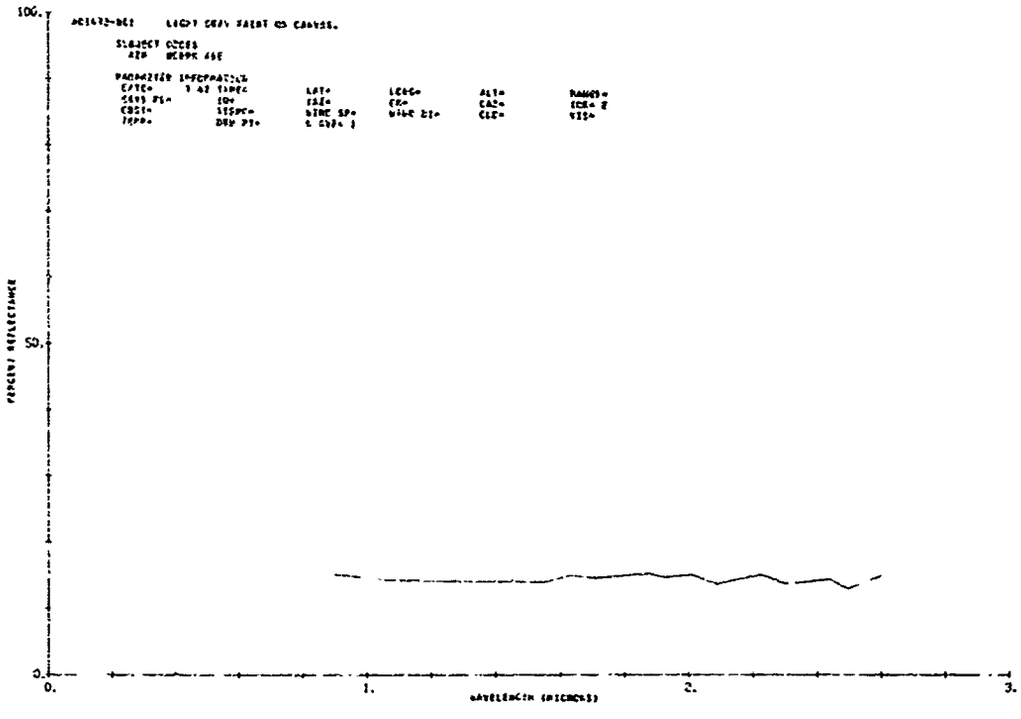
WAVELENGTH (MICRONS)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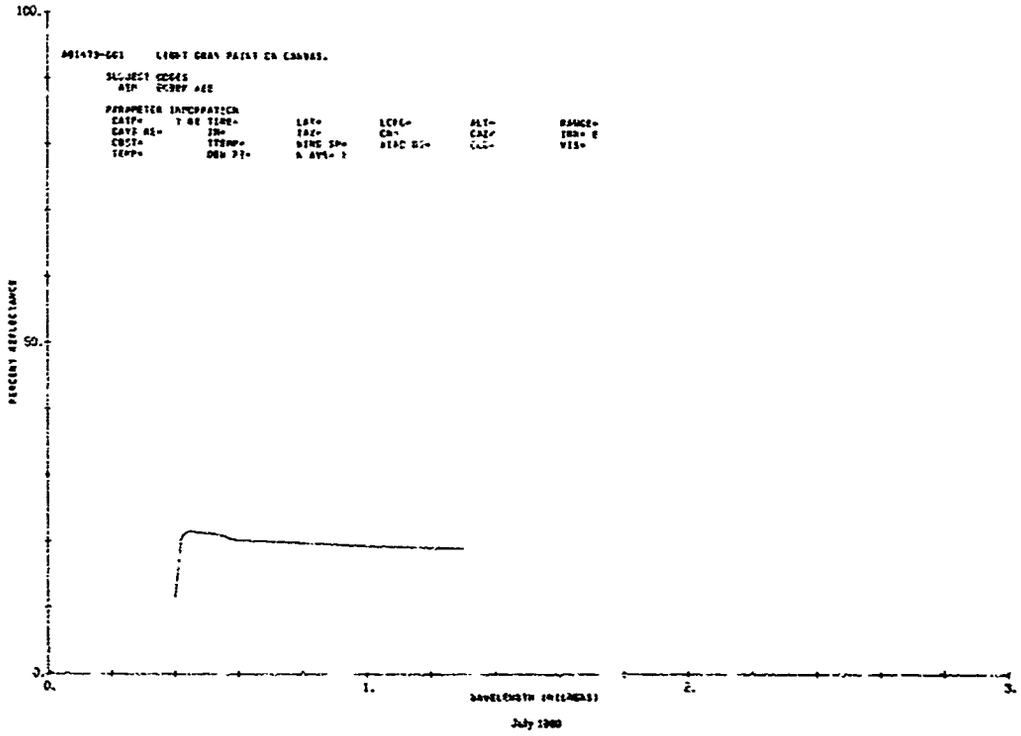
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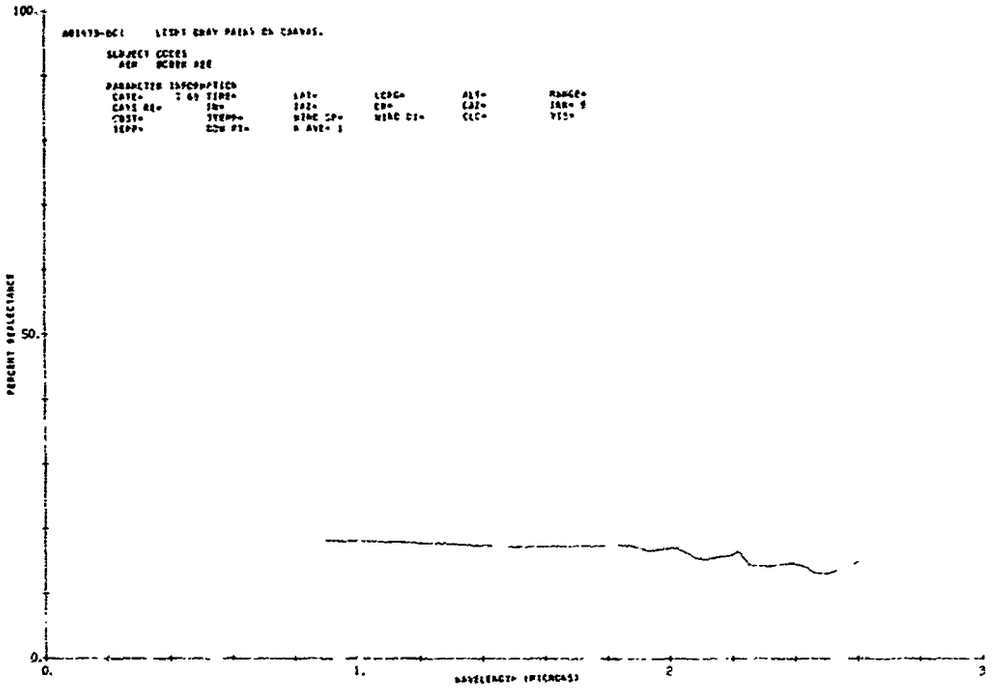
WAVELENGTH (MICRONS)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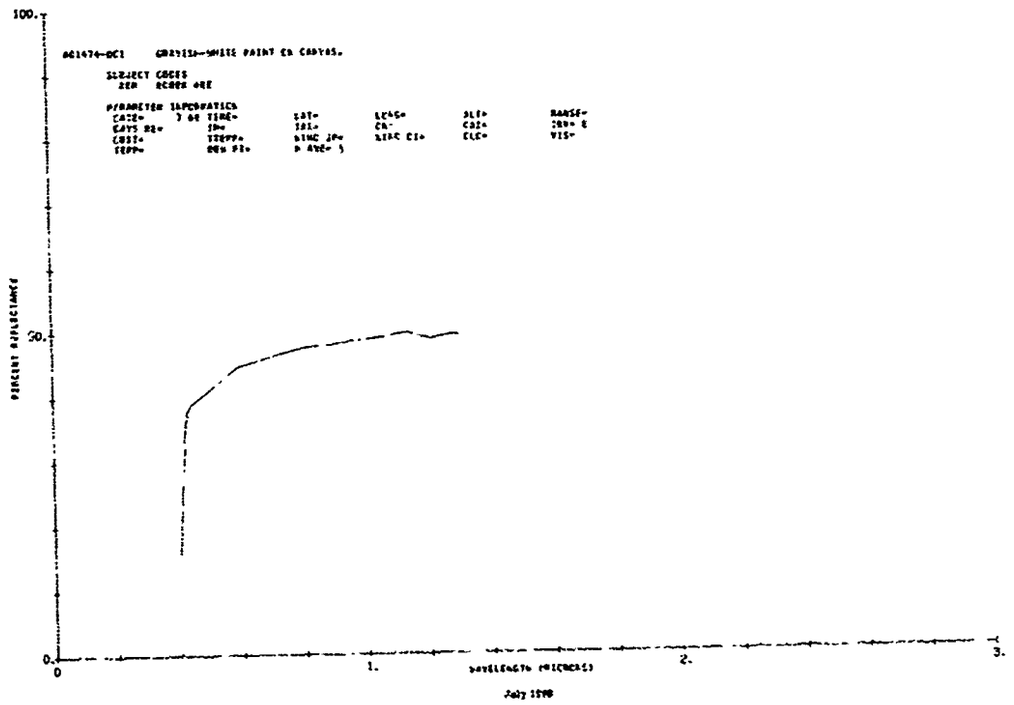
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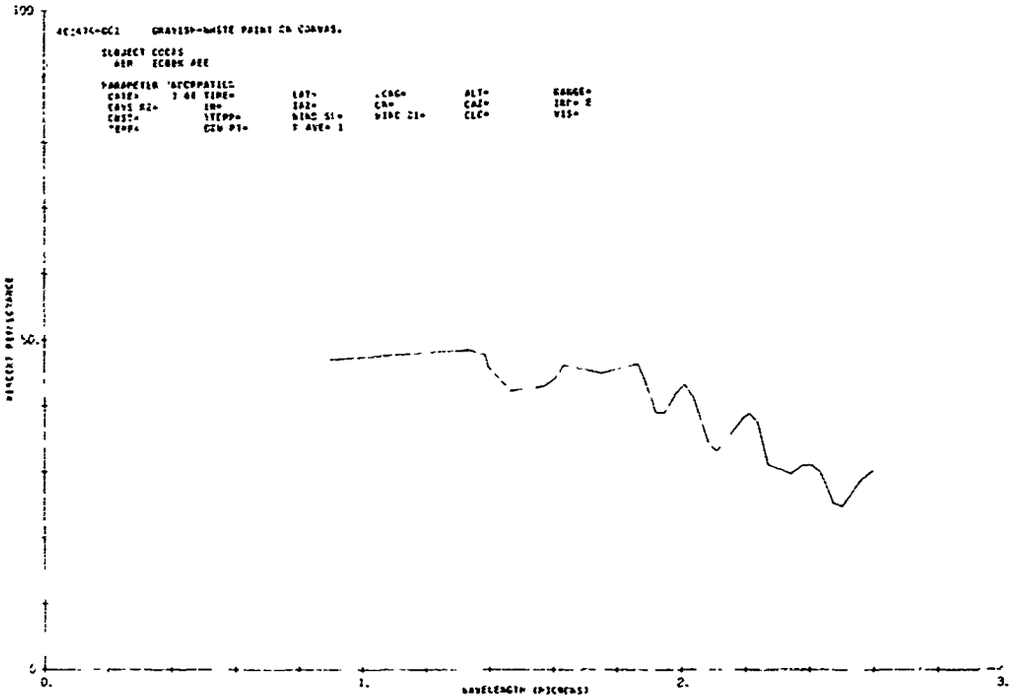
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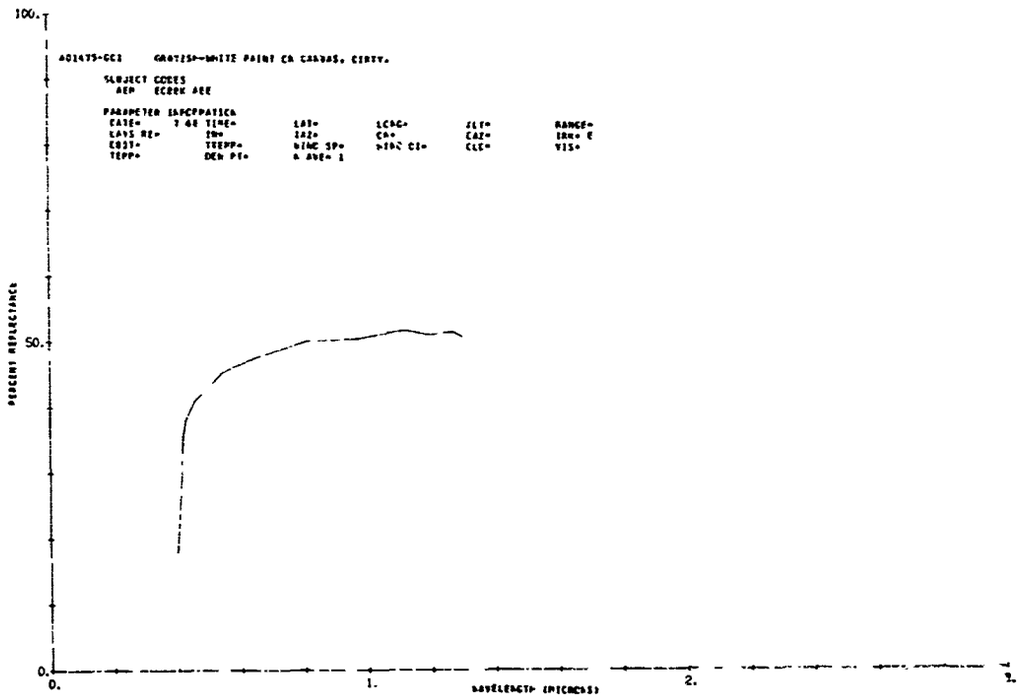
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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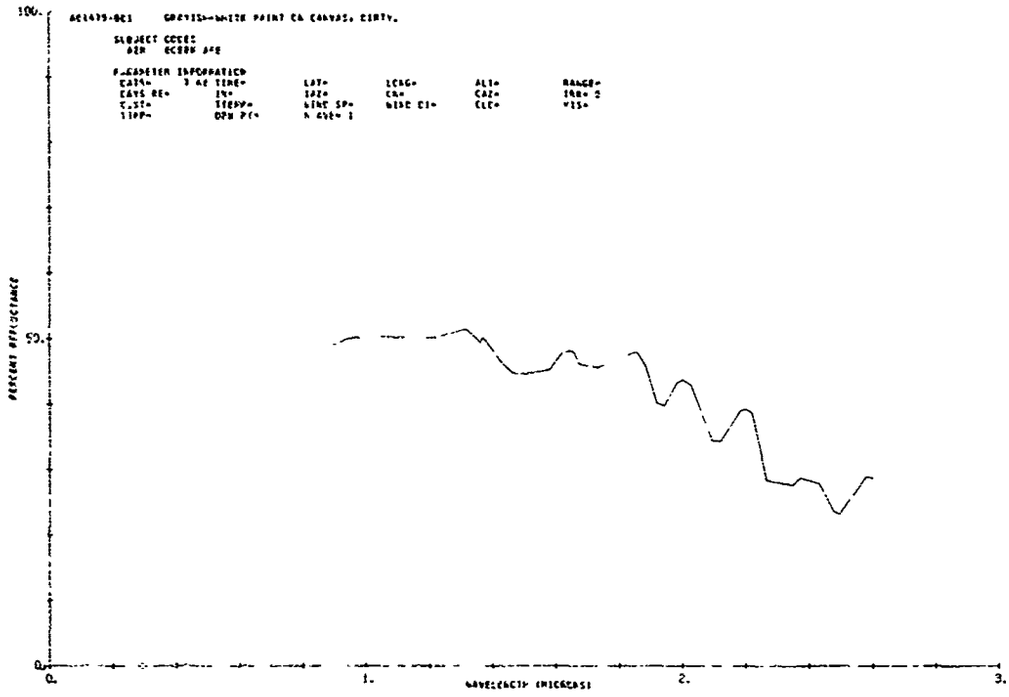
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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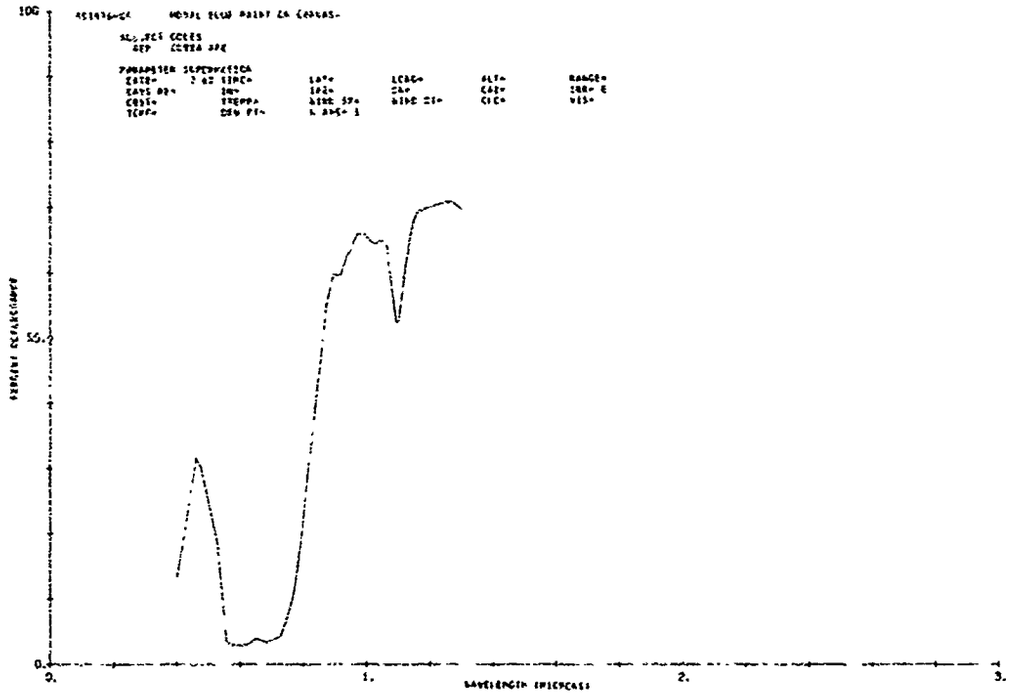
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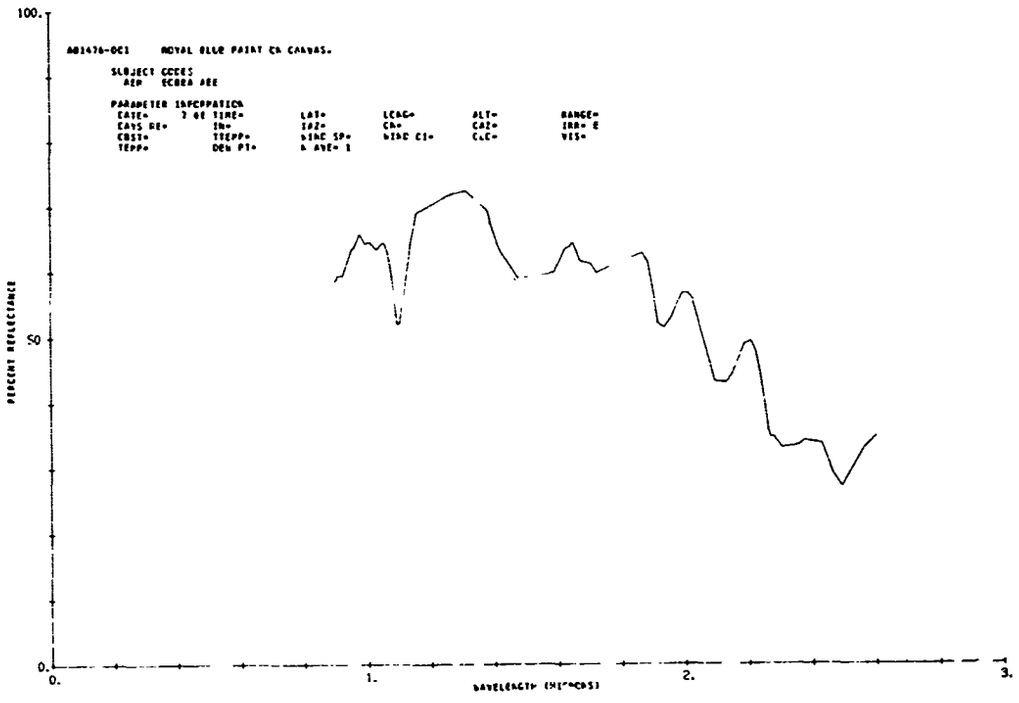
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AB1476-CC1 ROYAL BLUE PAINT ON CANVAS.
SUBJECT CODES
AEM ECORA AEE
PARAMETER INFORMATION
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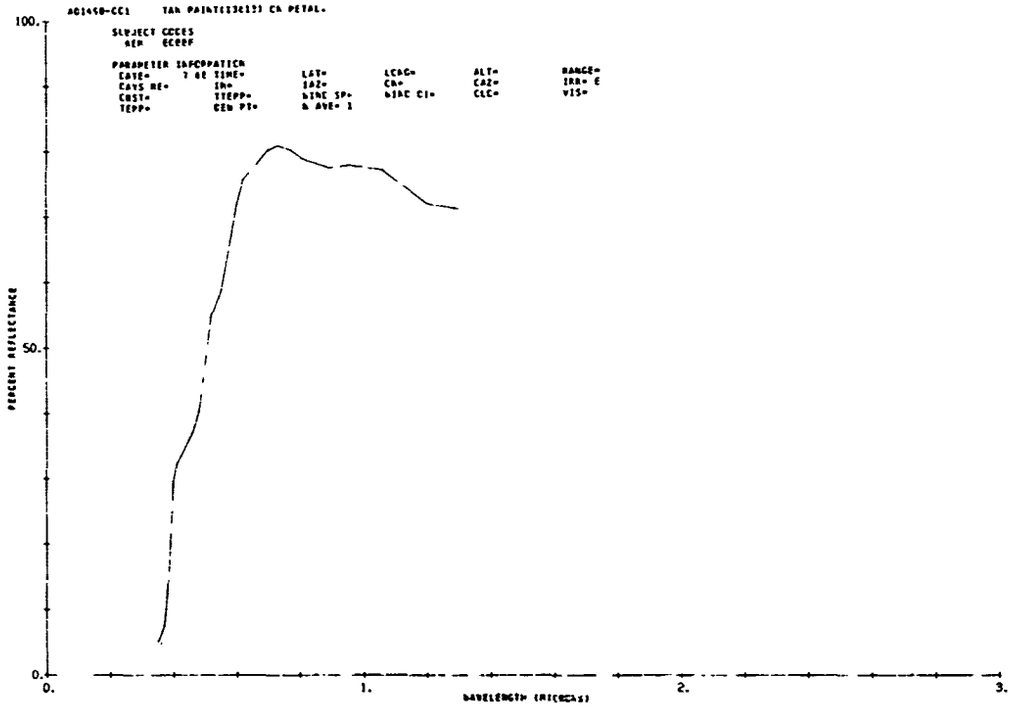
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AB1458-CC1 TAN PAINT(13C13) ON PETAL.
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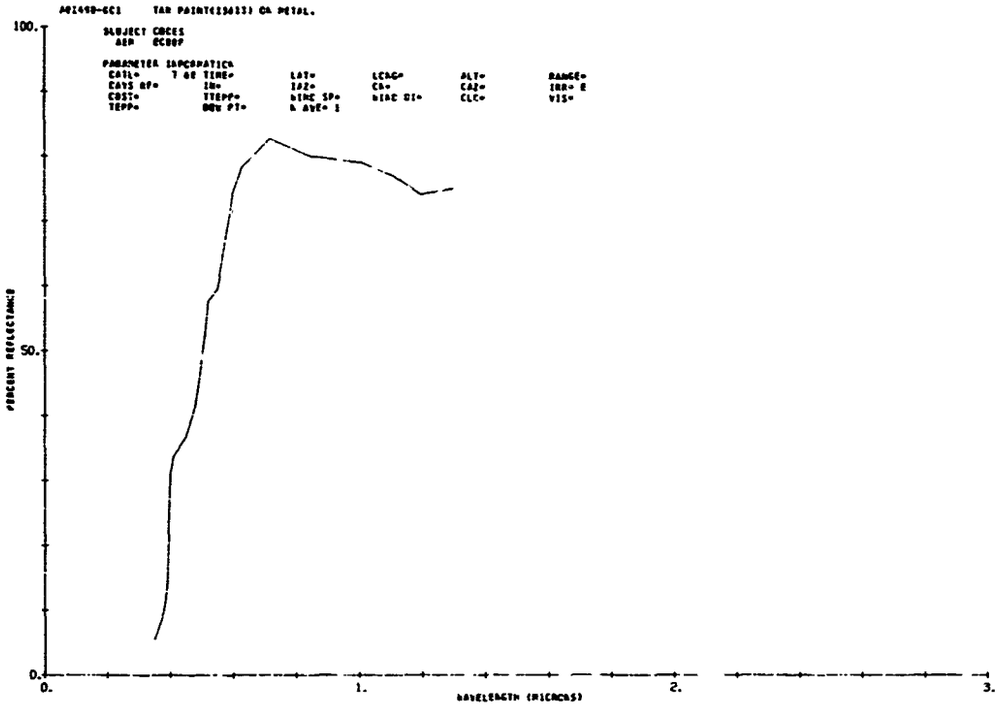
A61450-GC1 TAN PAINT(13613) ON METAL.
SUBJECT CODES
AEM ECOOF
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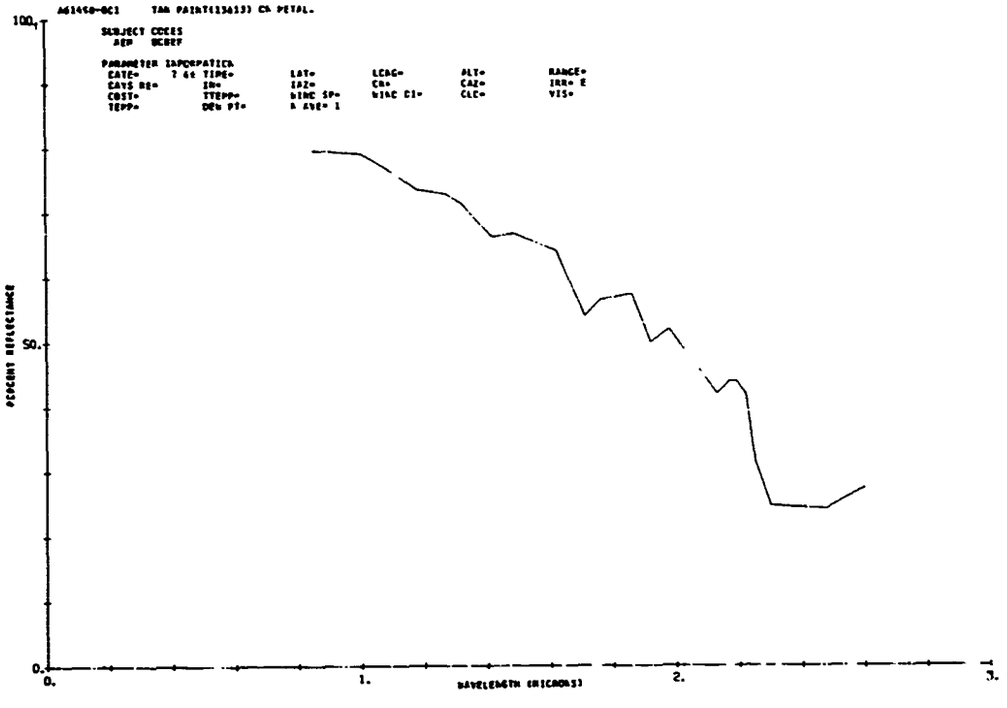
A61450-GC1 TAN PAINT(13613) ON METAL.
SUBJECT CODES
AEM ECOOF
PARAMETER INFORMATION
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DAYS RE= IN= IAZ= CN= CAZ= IRR= E
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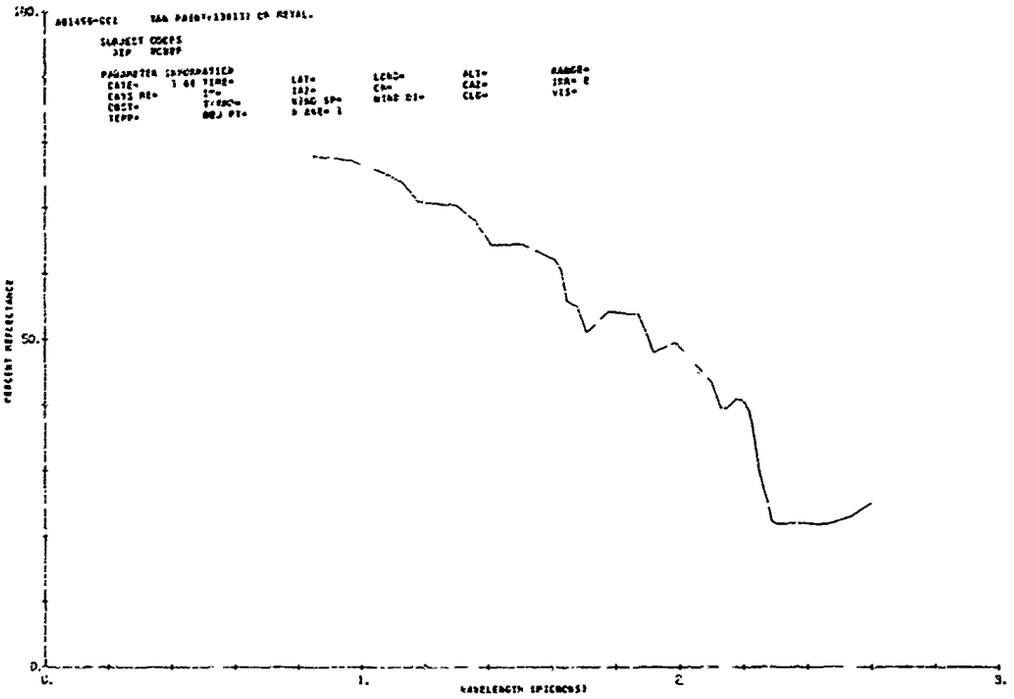
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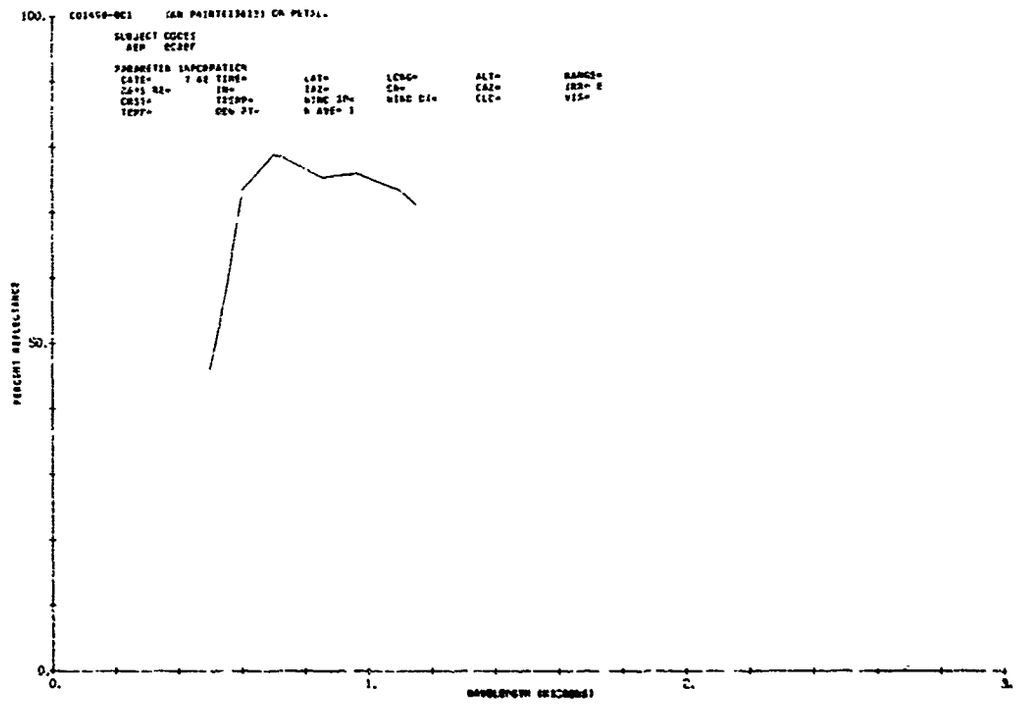
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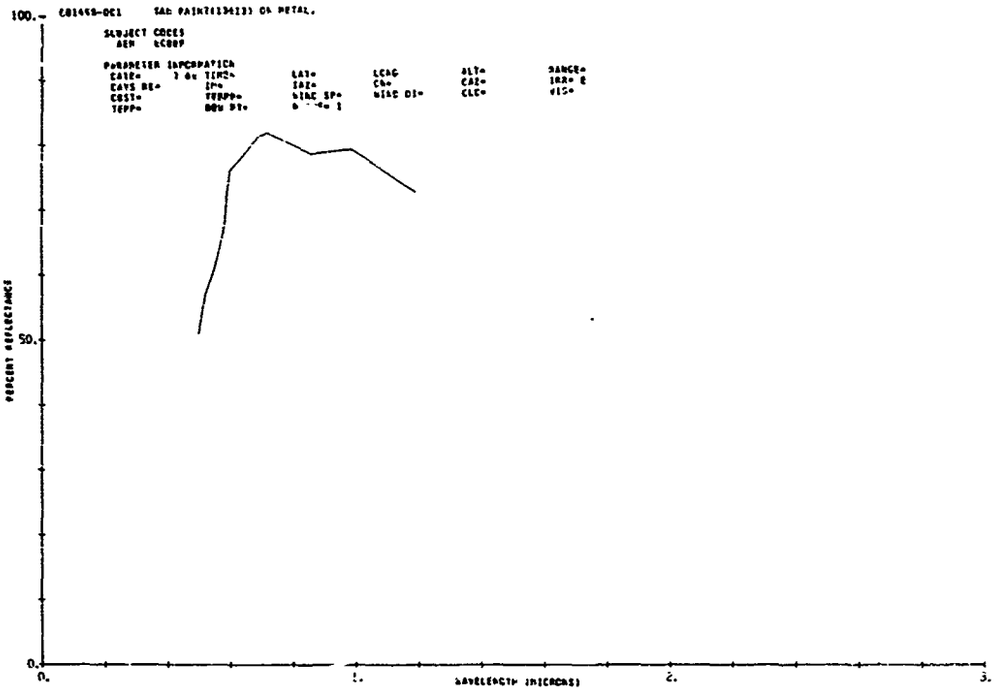
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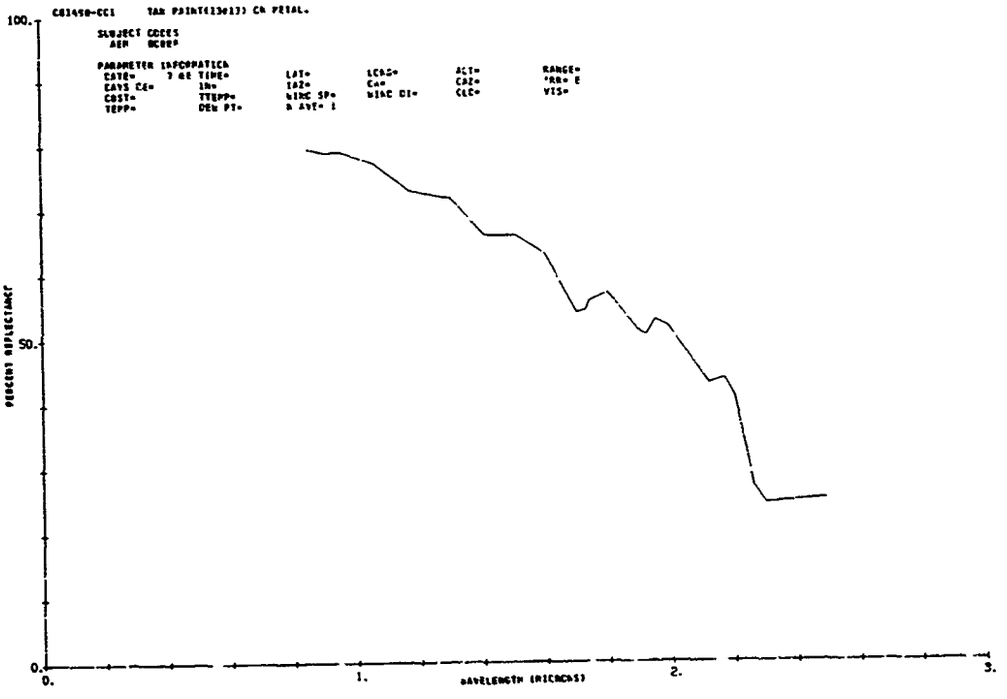
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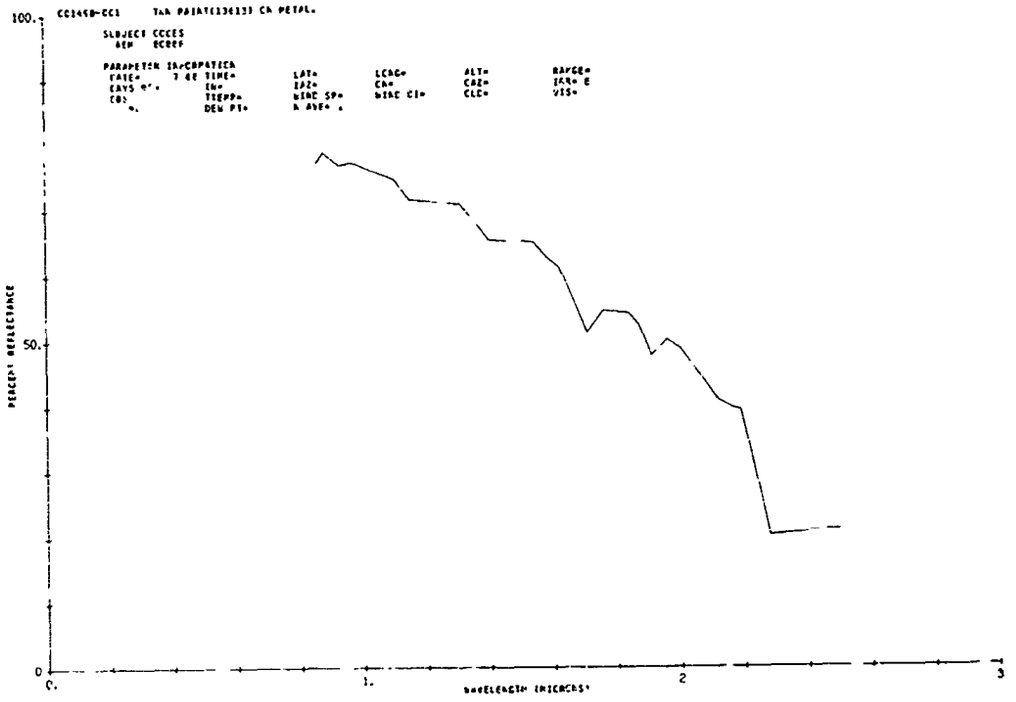
WAVELENGTH (MICRONS)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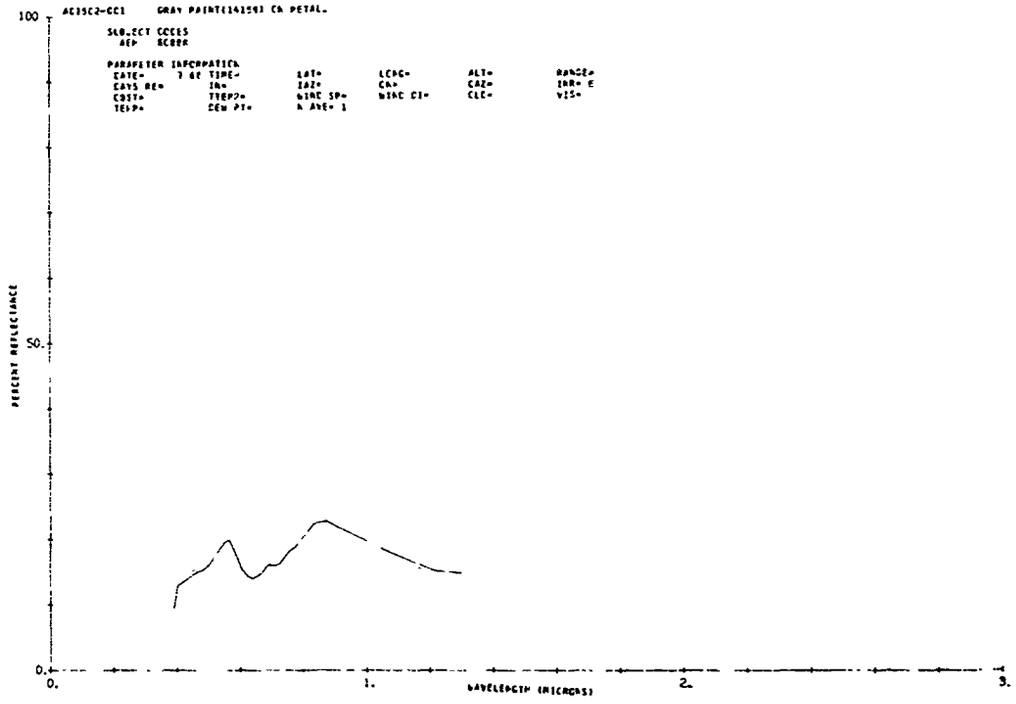
WAVELENGTH (MICRONS)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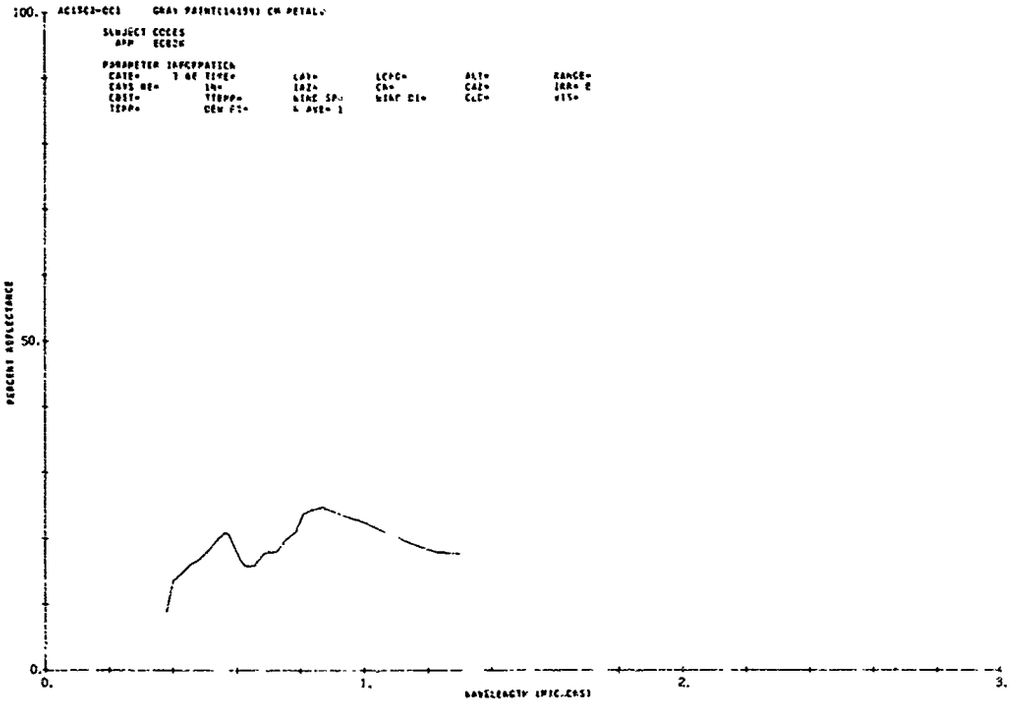
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AC15C2-0C1 GRAY PAINT(141591 CH PETAL.
SUBJECT CODES
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CAYS AE= IN= IAZ= CA= CAZ= IRR= E
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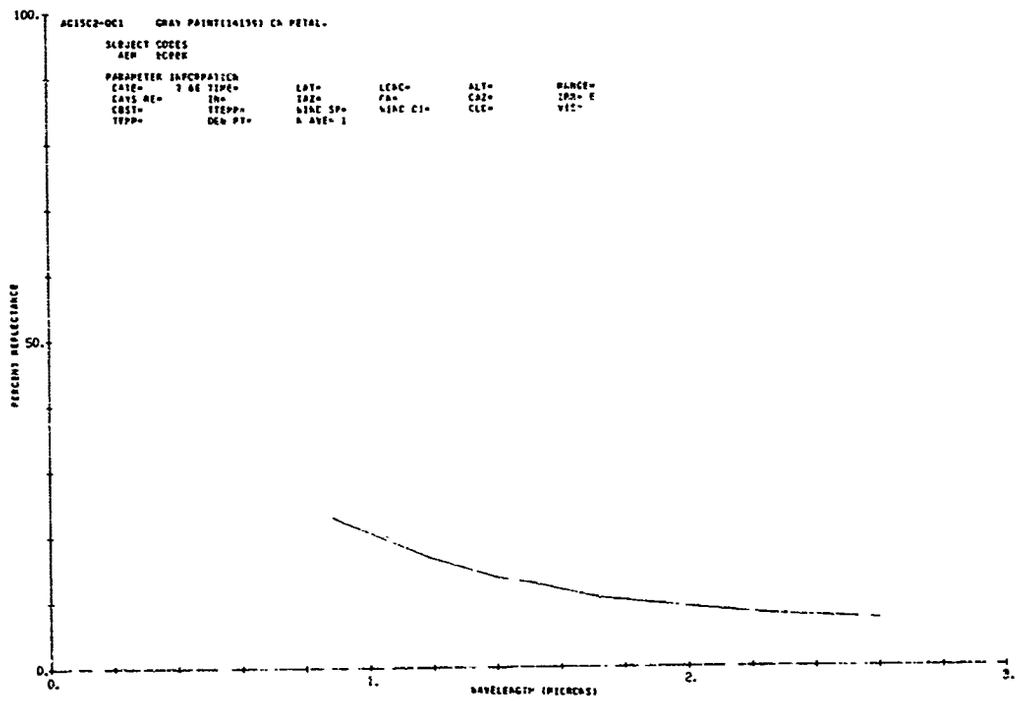
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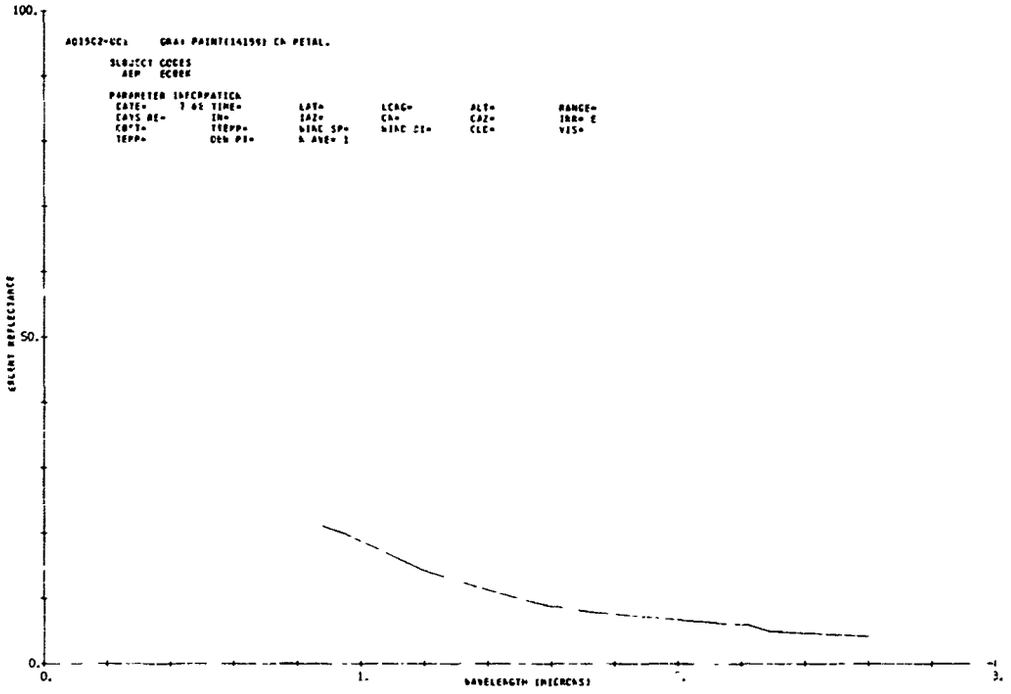
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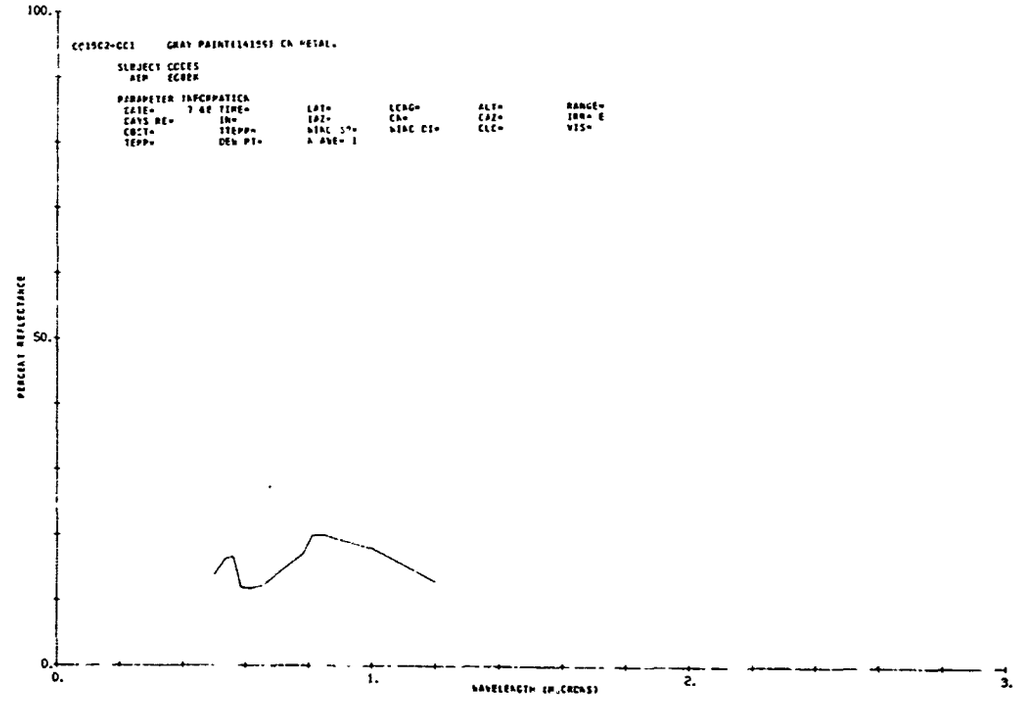
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PERCENT REFLECTANCE
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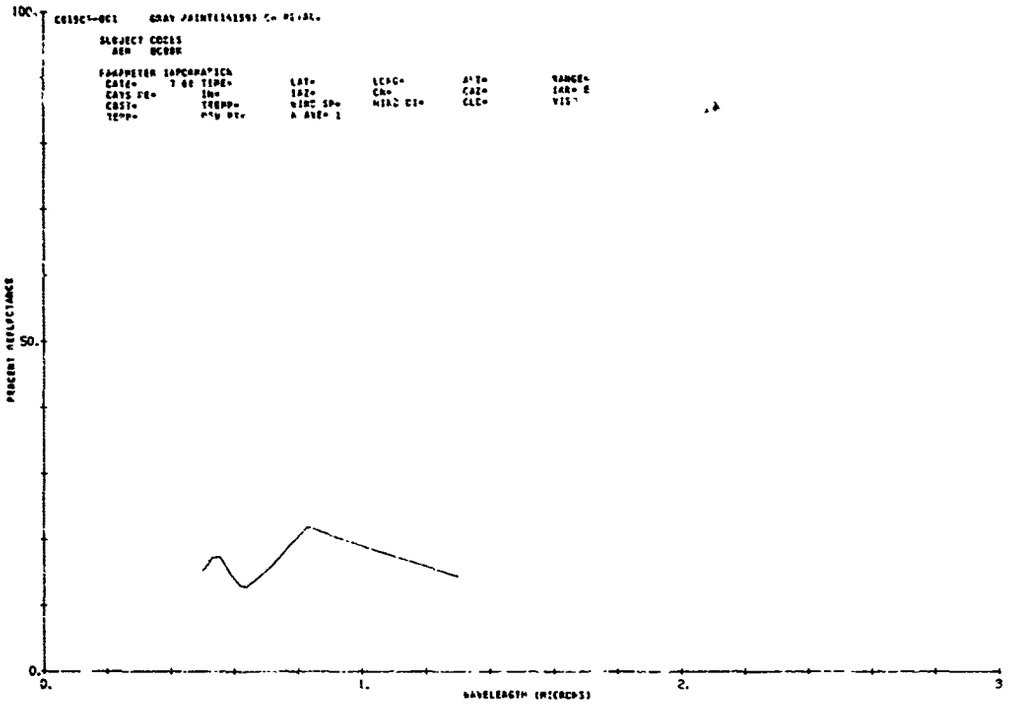
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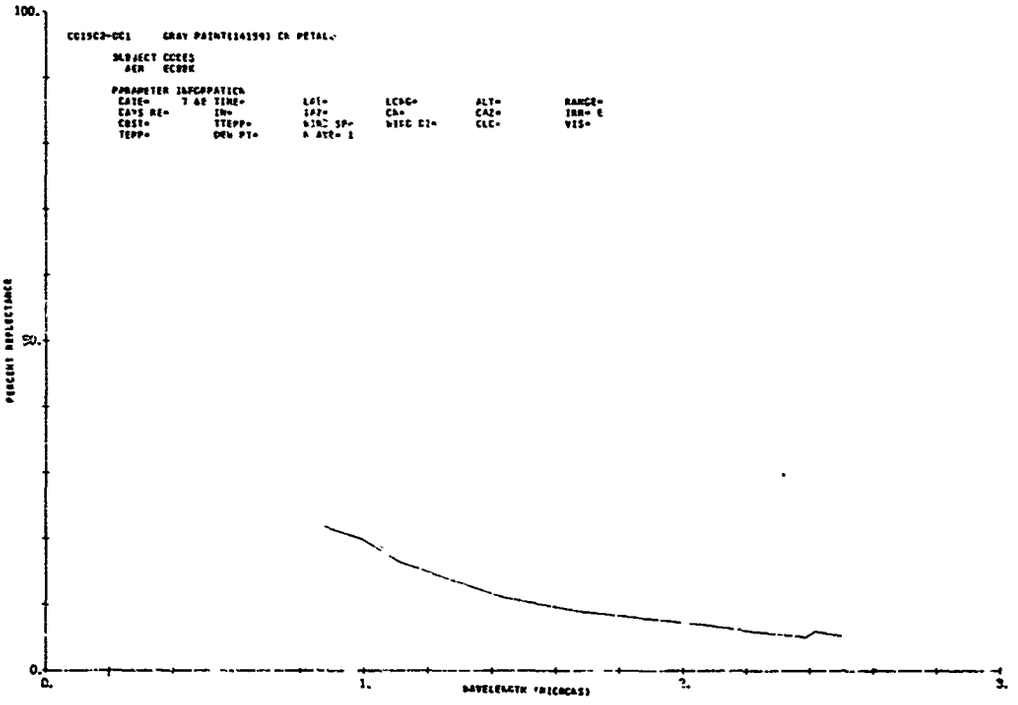
WAVELENGTH (MICRONS)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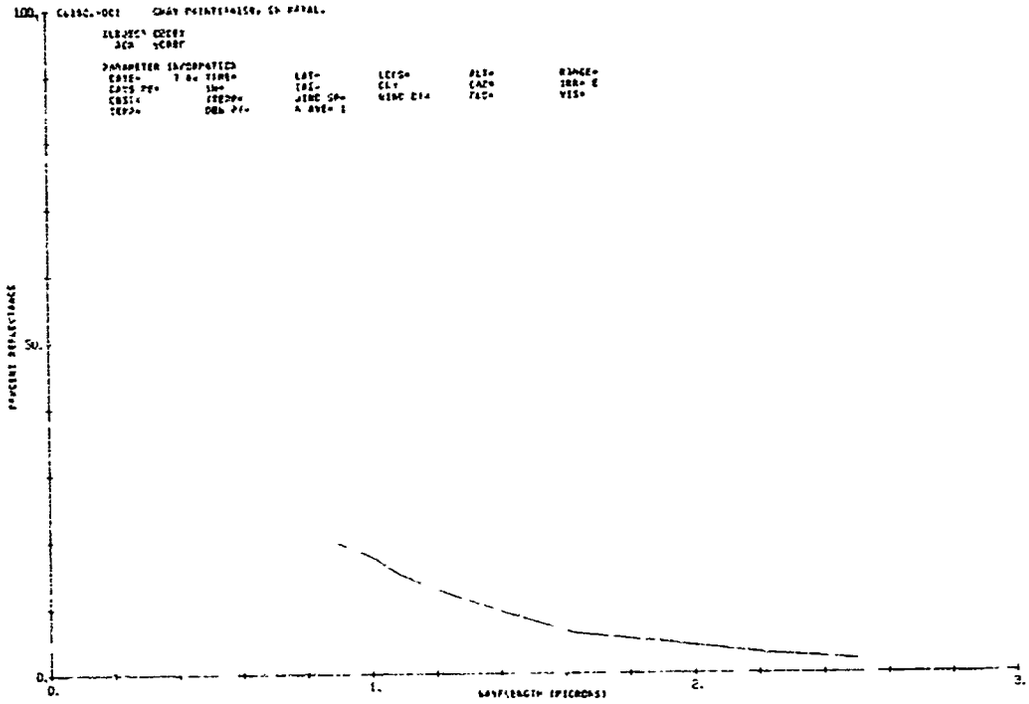
WAVELENGTH (MICRONS)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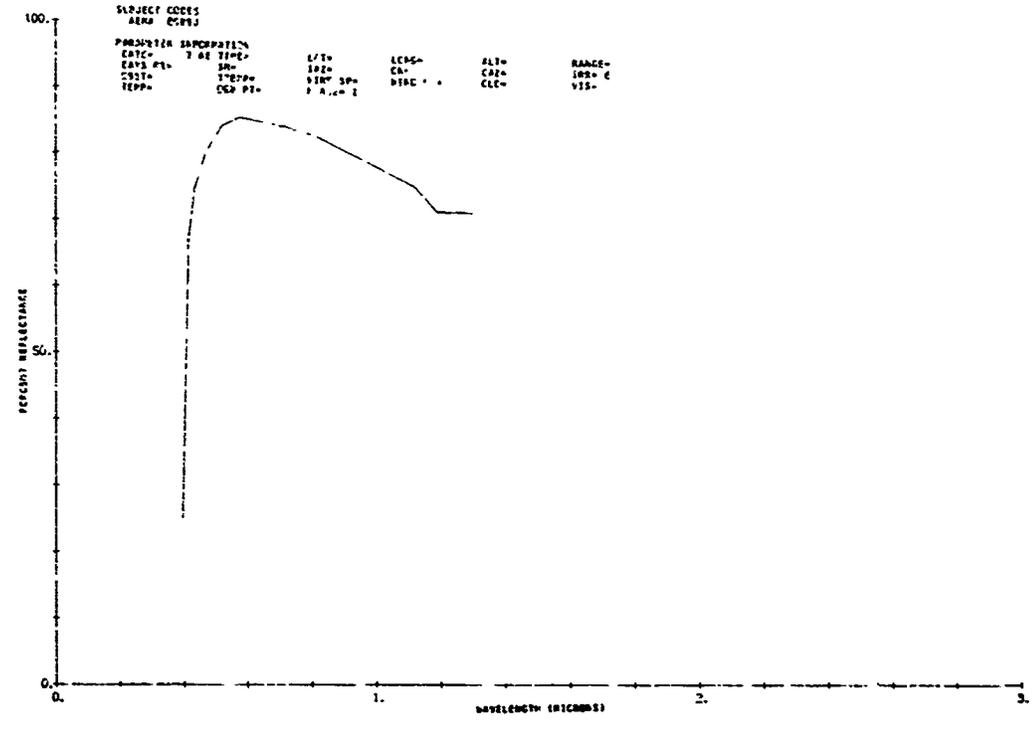
WAVELENGTH (MICRONS)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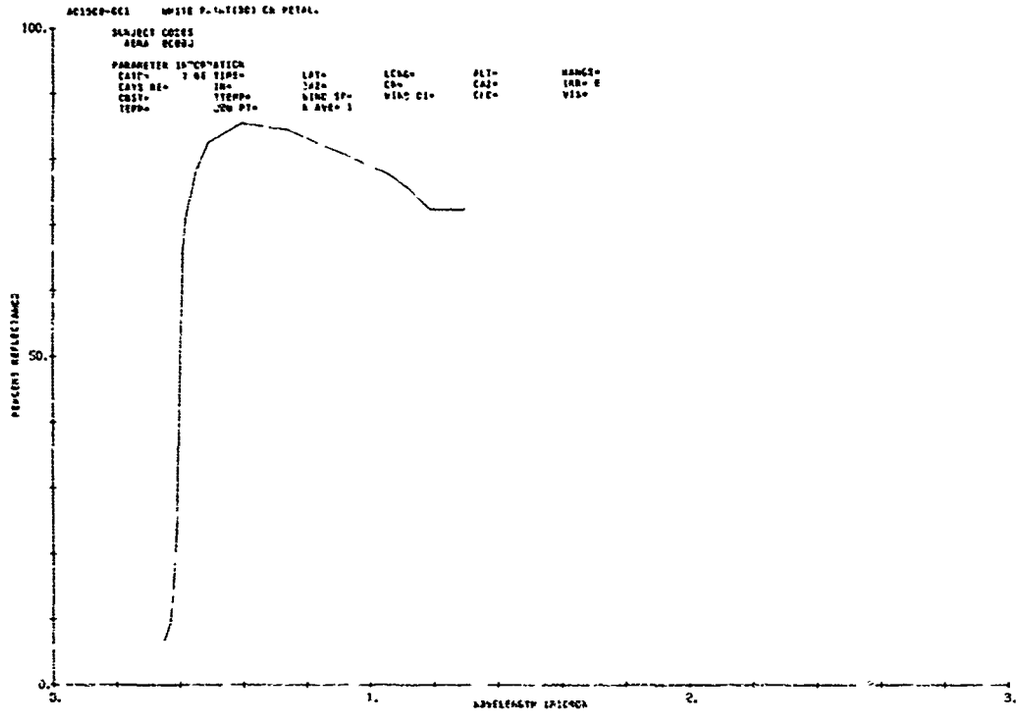
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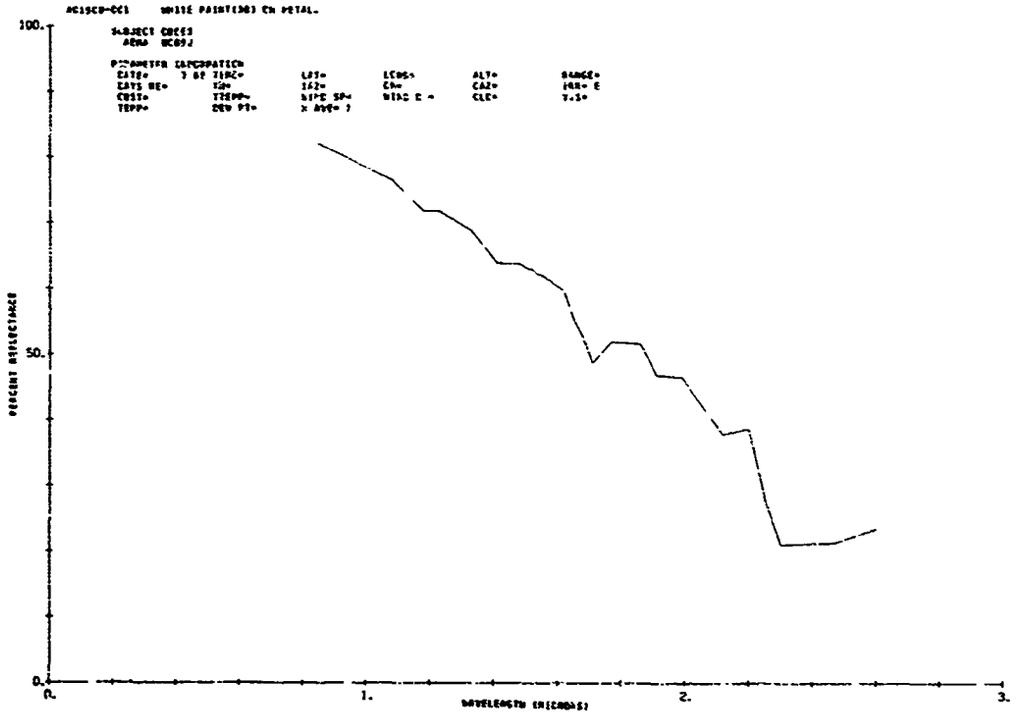
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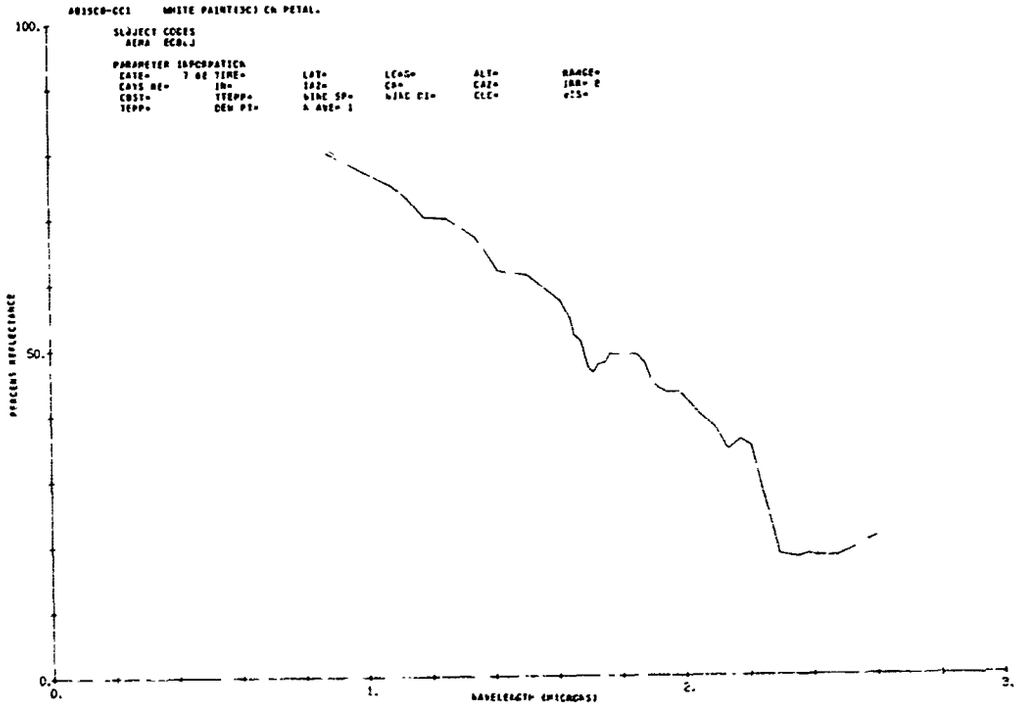
A015C0-CC1 WHITE PAINT(3C) ON PETAL.
SUBJECT CODES
AEMA ECOLJ
PARAMETER INFORMATION
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TEMP= DEW PT= N AVE= 1
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PERCENT REFLECTANCE
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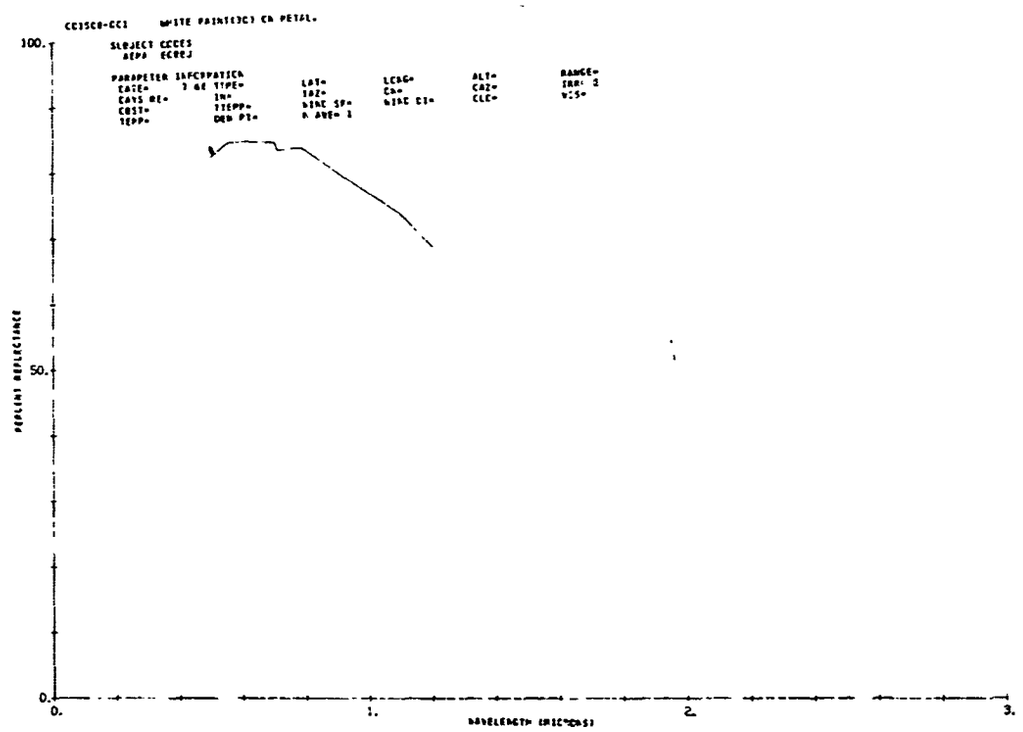
WAVELENGTH (MICRONS)


CC15C0-CC1 WHITE PAINT(3C) ON PETAL.
SUBJECT CODES
AEMA ECOLJ
PARAMETER INFORMATION
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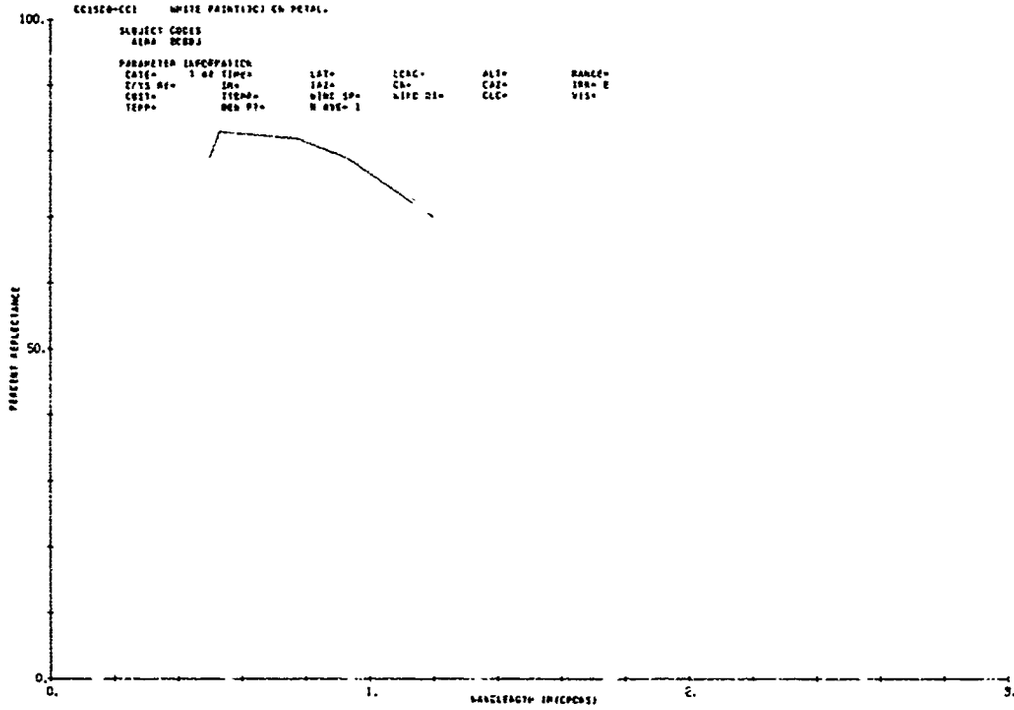
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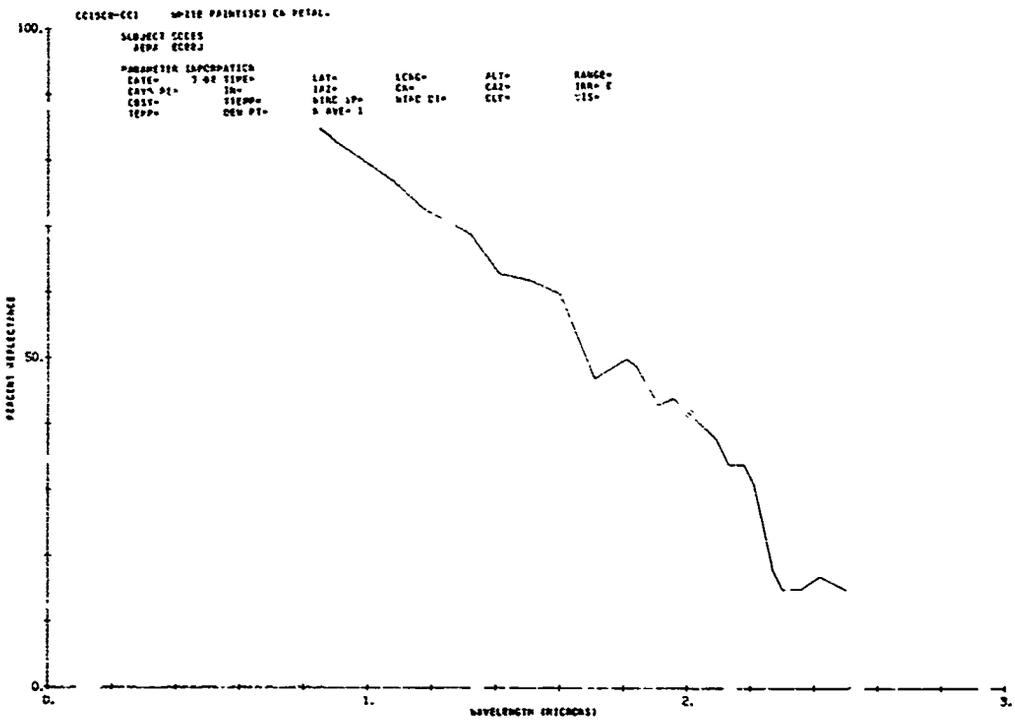
WAVELENGTH (MICRONS)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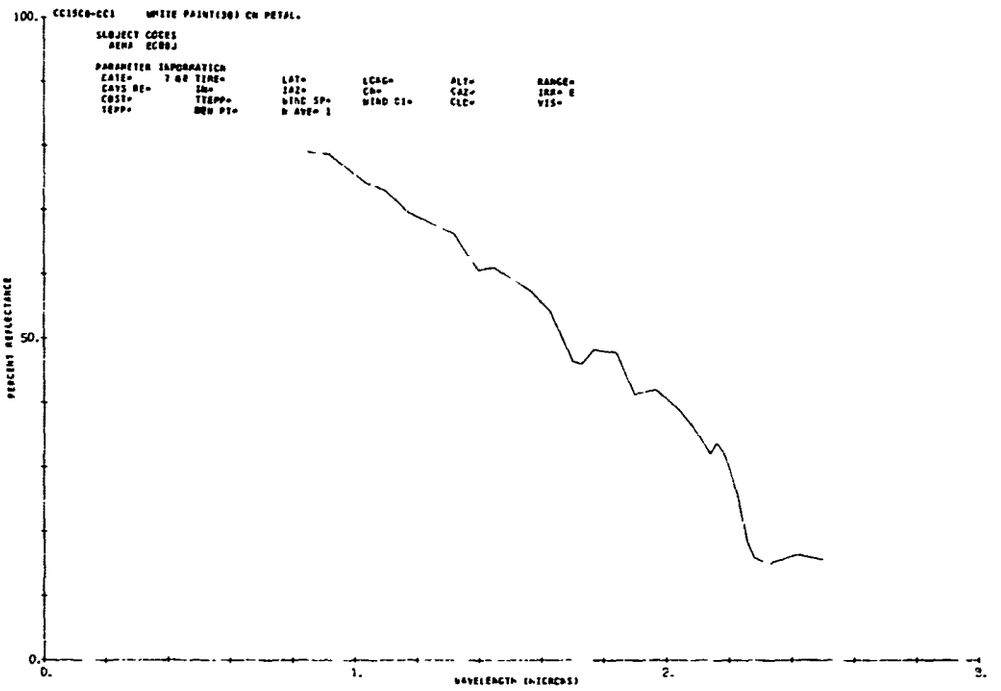
WAVELENGTH (MICRONS)


CC15C0-CC1 WHITE PAINT(30) ON METAL.
SUBJECT CODES
AEMA ECB0J
PARAMETER INFORMATION
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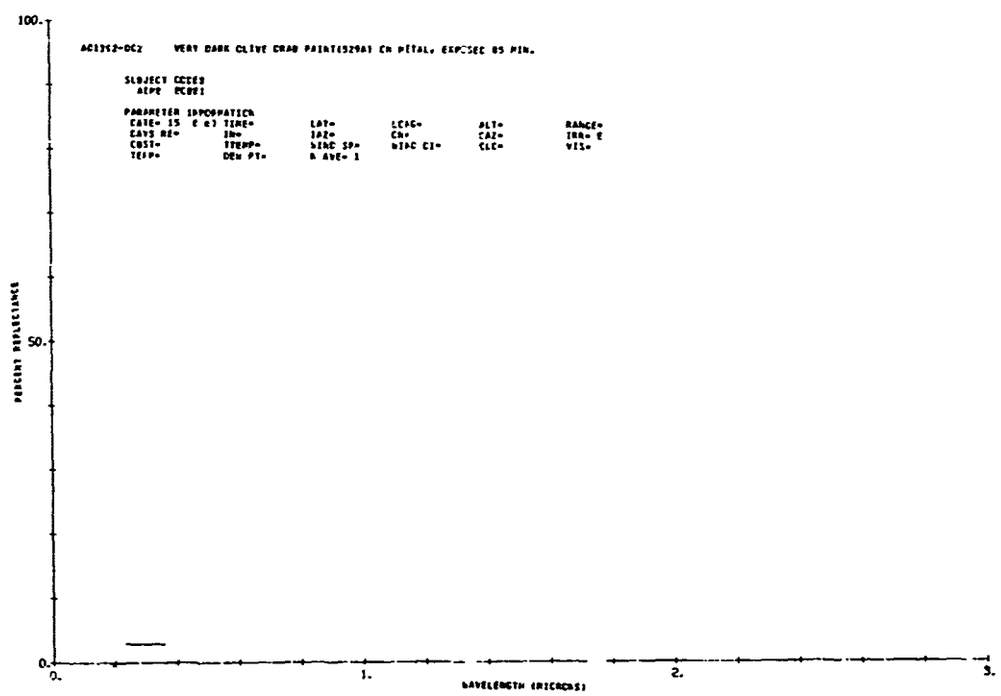
AC13C2-DC2 VERY DARK OLIVE DRAB PAINT(529A) ON METAL, EXPOSED 85 MIN.
SUBJECT CODES
AEMA ECB0I
PARAMETER INFORMATION
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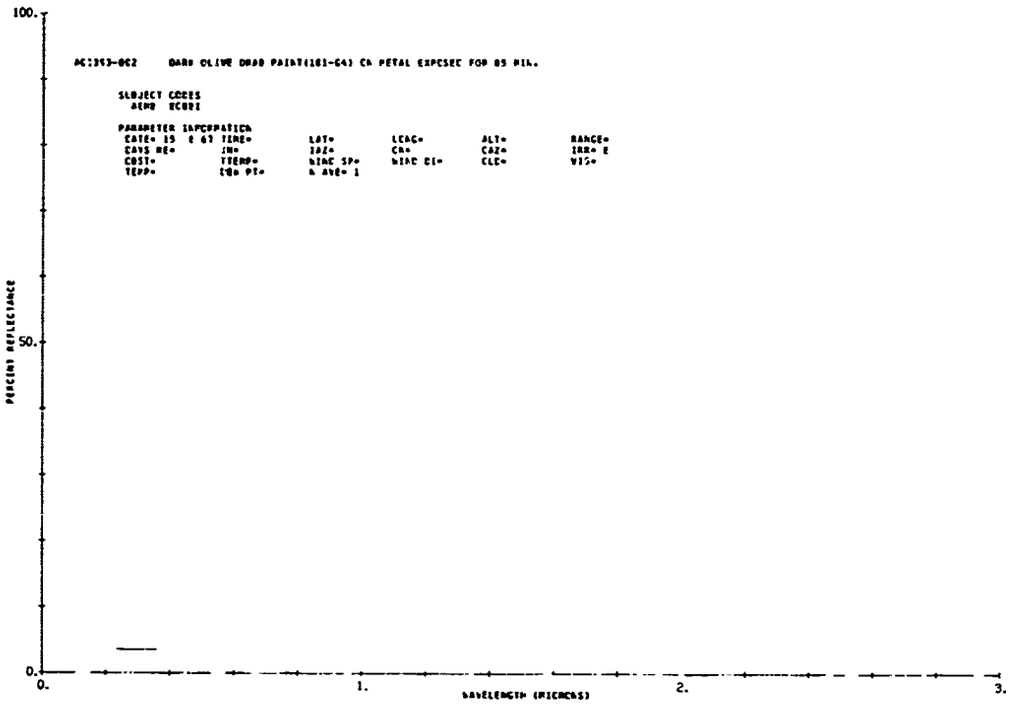
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WAVELENGTH (MICRONS)
SUBJECT CODES
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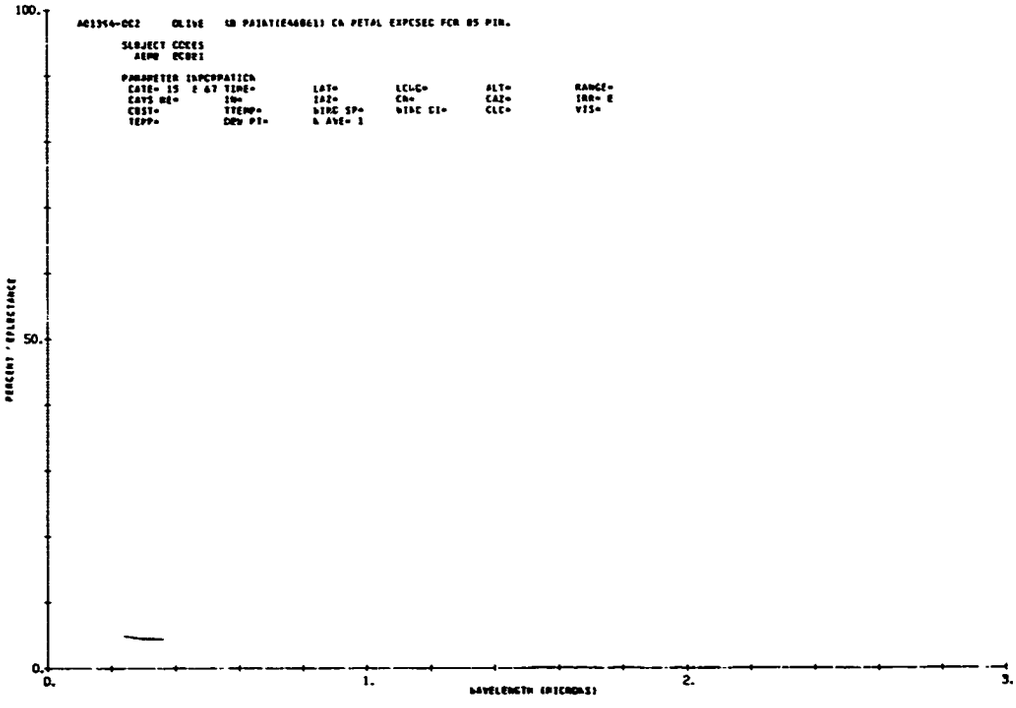
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WAVELENGTH (MICRONS)
SUBJECT CODES
PARAMETER INFORMATION
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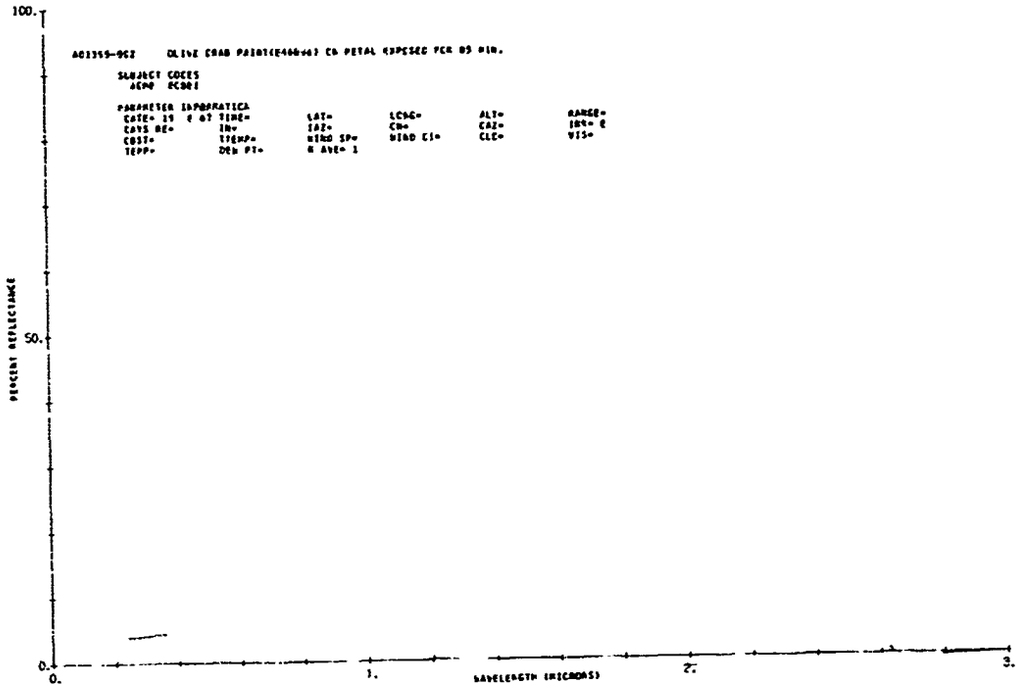
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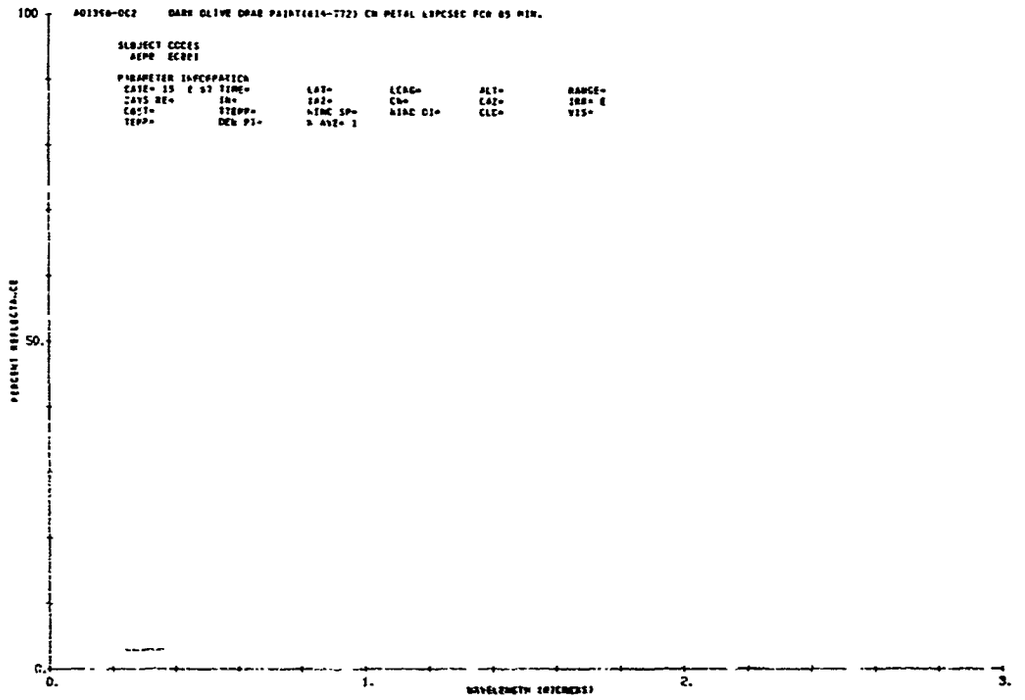
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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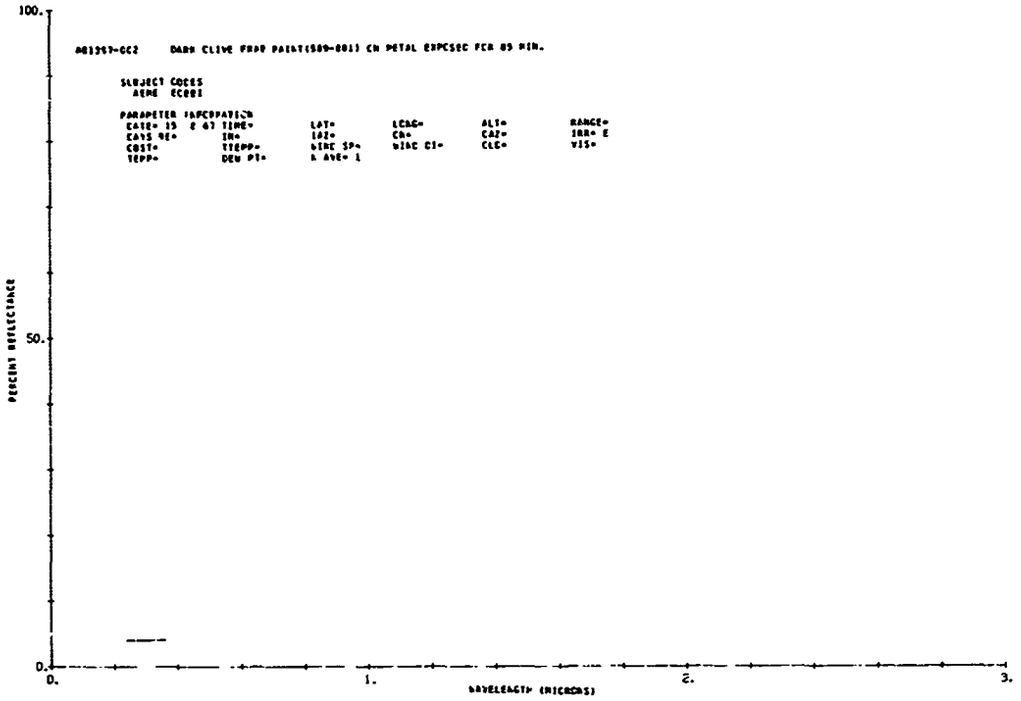
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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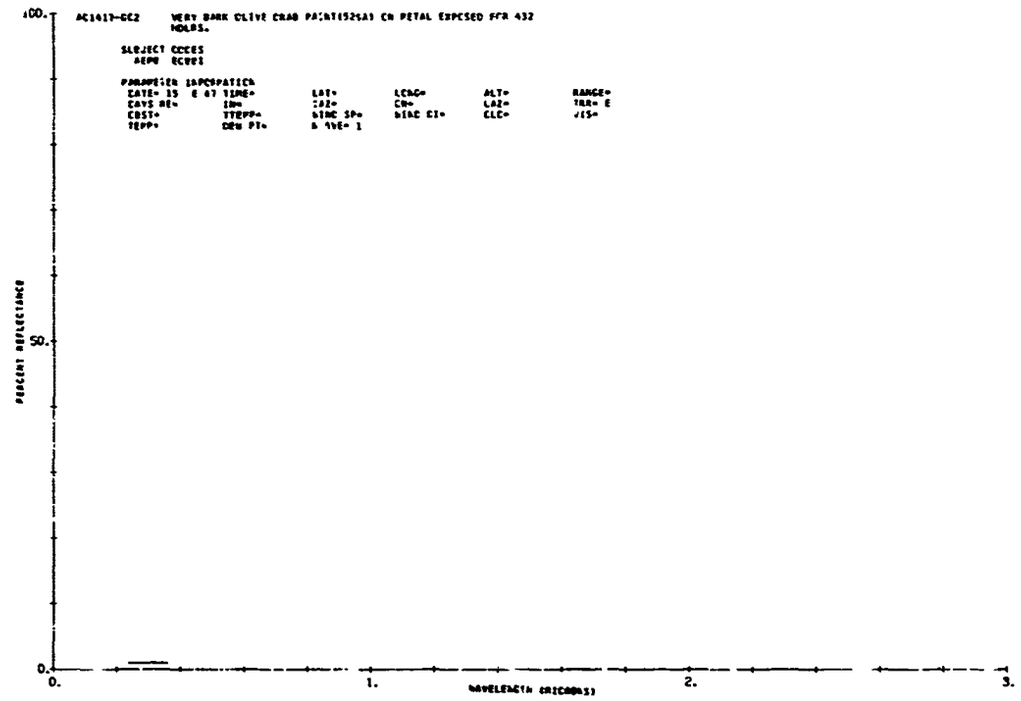
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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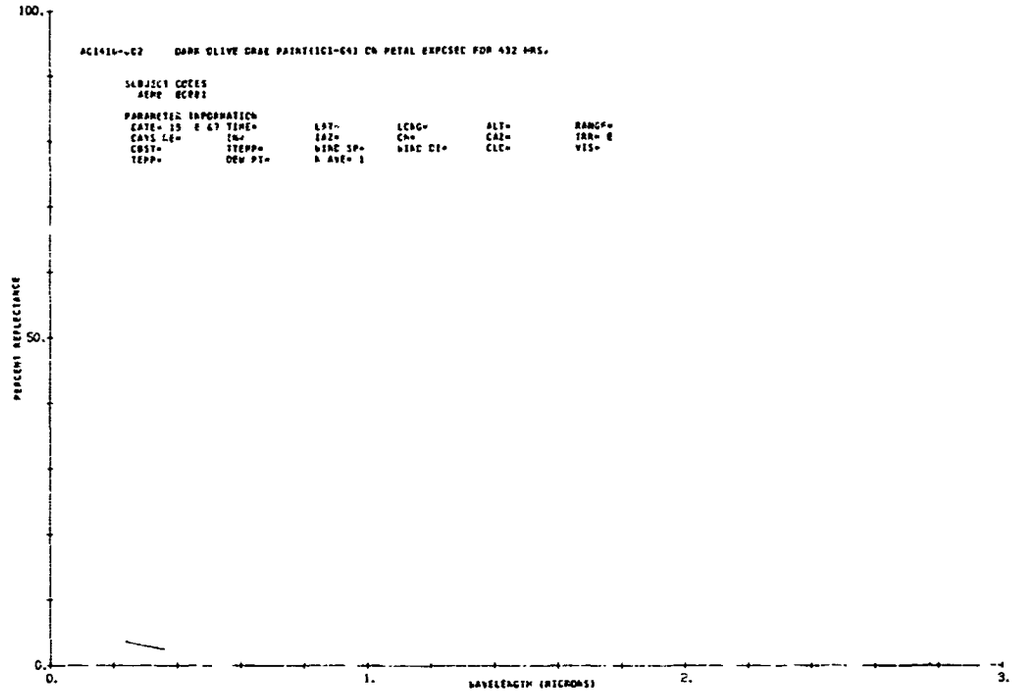
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)


AC1416-0C2 DARK OLIVE DRAB PAINT(101-64) ON METAL EXPOSED FOR 432 HRS.
SUBJECT CODES
AEMB ECBBI
PARAMETER INFORMATION
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DAYS DE= IN= IAZ= CN= CAZ= IRR= E
COST= TTEMP= WIND SP= WIND DI= CLC= VIS=
TEMP= DEW PT= N AVE= 1
PERCENT REFLECTANCE
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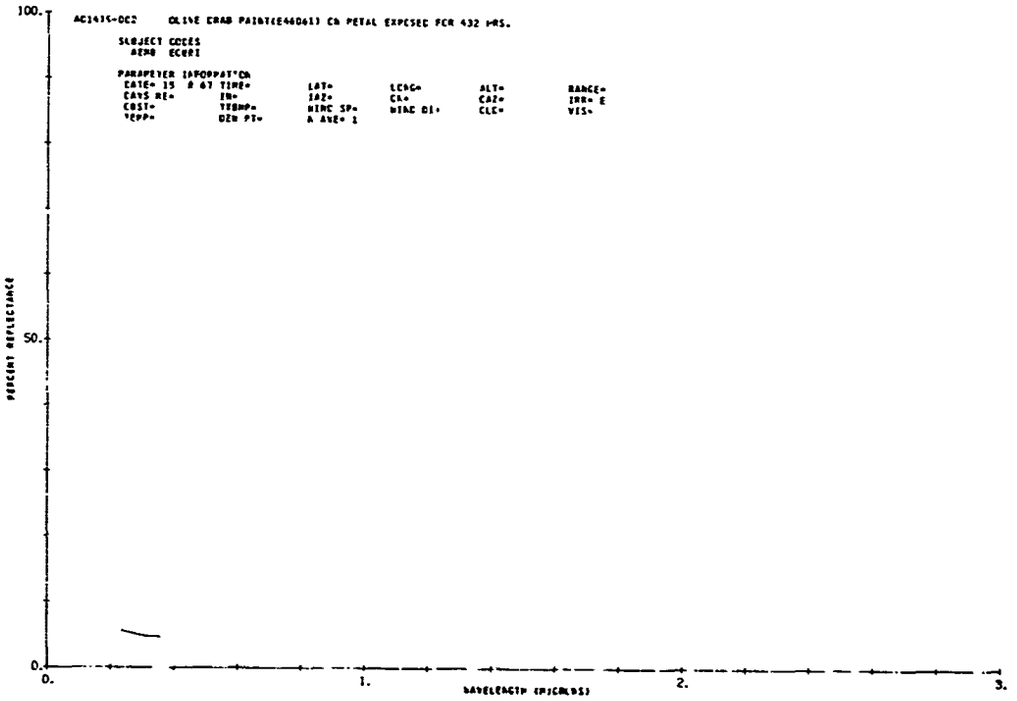
1.
2.
3.
WAVELENGTH (MICRONS)


AC1415-0C2 OLIVE DRAB PAINT(E46061) ON METAL EXPOSED FOR 432 HRS.
SUBJECT CODES
AEMB ECBBI
PARAMETER INFORMATION
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DAYS RE= IN= IAZ= CN= CAZ= IRR= E
COST= TTEMP= WIND SP= WIND DI= CLC= VIS=
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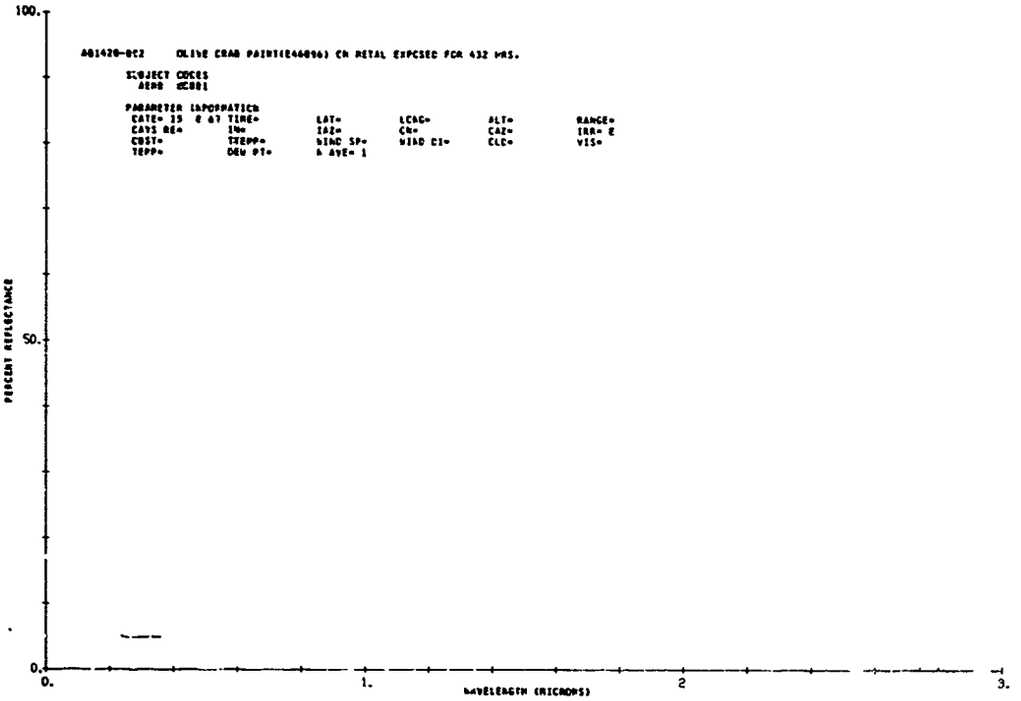
1.
2.
3.
WAVELENGTH (MICRONS)


A01420-0C2 OLIVE DRAB PAINT(E46096) CN RETAL EXPOSED FOR 432 HRS.
SUBJECT CODES
AERO 0C001
PARAMETER INFORMATION
DATE= 15 0 67 TIME=
DAYS RE=
COST=
TEMP=
LAT=
LONG=
ALT=
RANGE=
IN=
IAZ=
CN=
CAZ=
IRR= E
TTEMP=
WIND SP=
WIND DI=
CLD=
VIS=
DEW PT=
N AVE= 1
PERCENT REFLECTANCE
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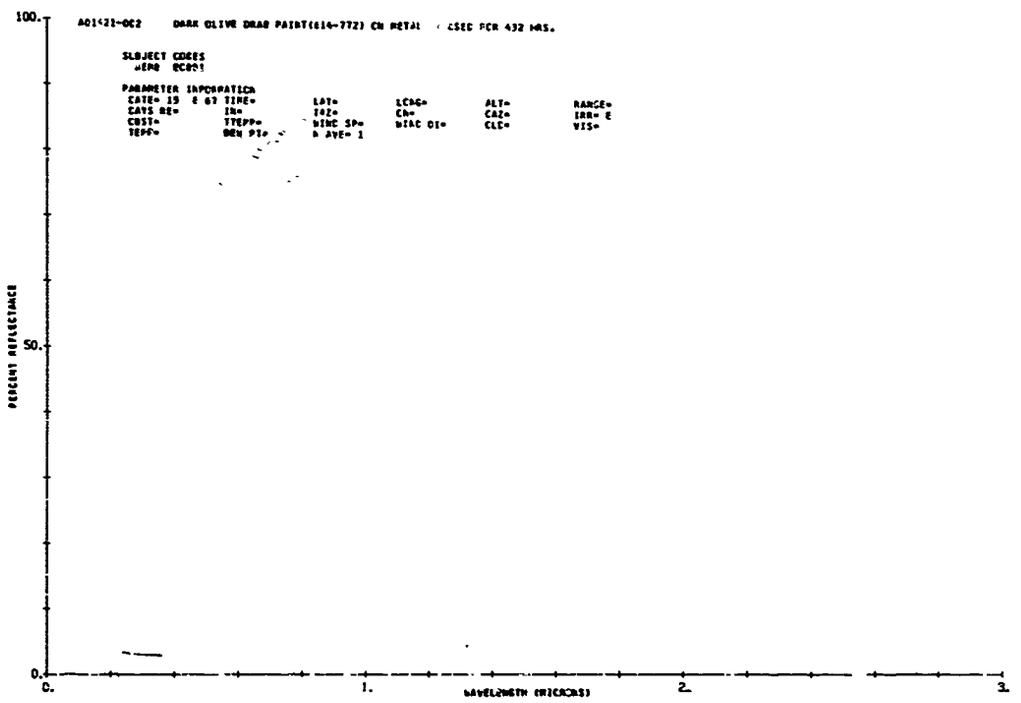
50.
0.
0.
1.
2
3.
WAVELENGTH (MICRONS)


A01421-0C2 DARK OLIVE DRAB PAINT(616-772) CN RETAL EXPOSED FOR 432 HRS.
SUBJECT CODES
AERO 0C001
PARAMETER INFORMATION
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DAYS RE=
COST=
TEMP=
LAT=
LONG=
ALT=
RANGE=
IN=
IAZ=
CN=
CAZ=
IRR= E
TTEMP=
WIND SP=
WIND DI=
CLD=
VIS=
DEW PT=
N AVE= 1
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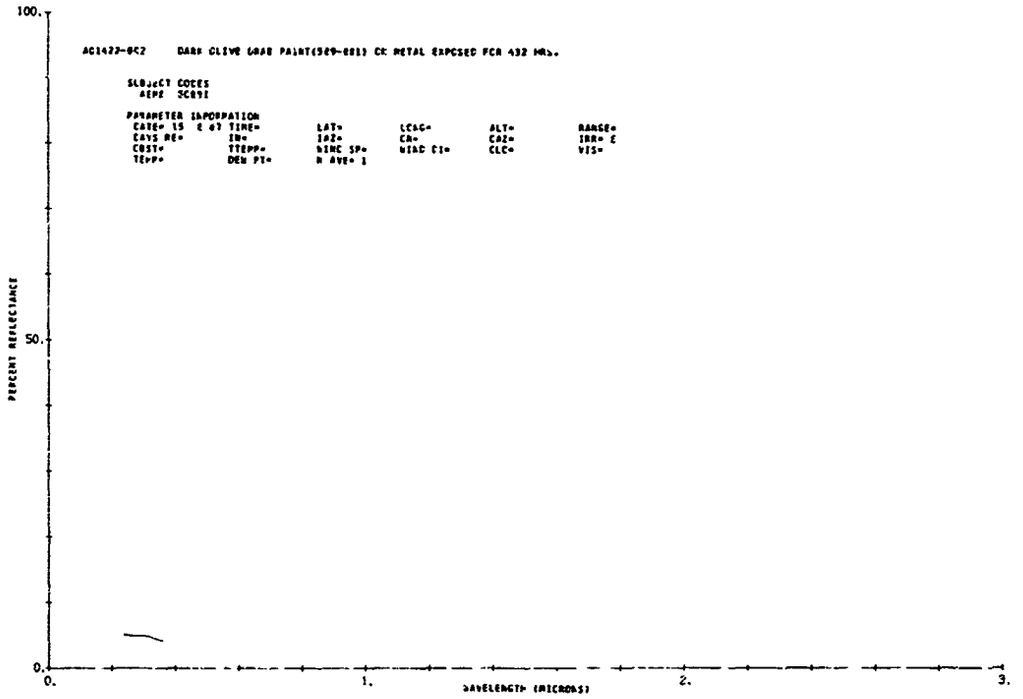
3.
WAVELENGTH (MICRONS)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AC1423-0C2 DARK OLIVE DRAB PAINT(S29-081) ON METAL EXPOSED FOR 432 HRS.
SUBJECT CODES
PARAMETER INFORMATION
PERCENT REFLECTANCE
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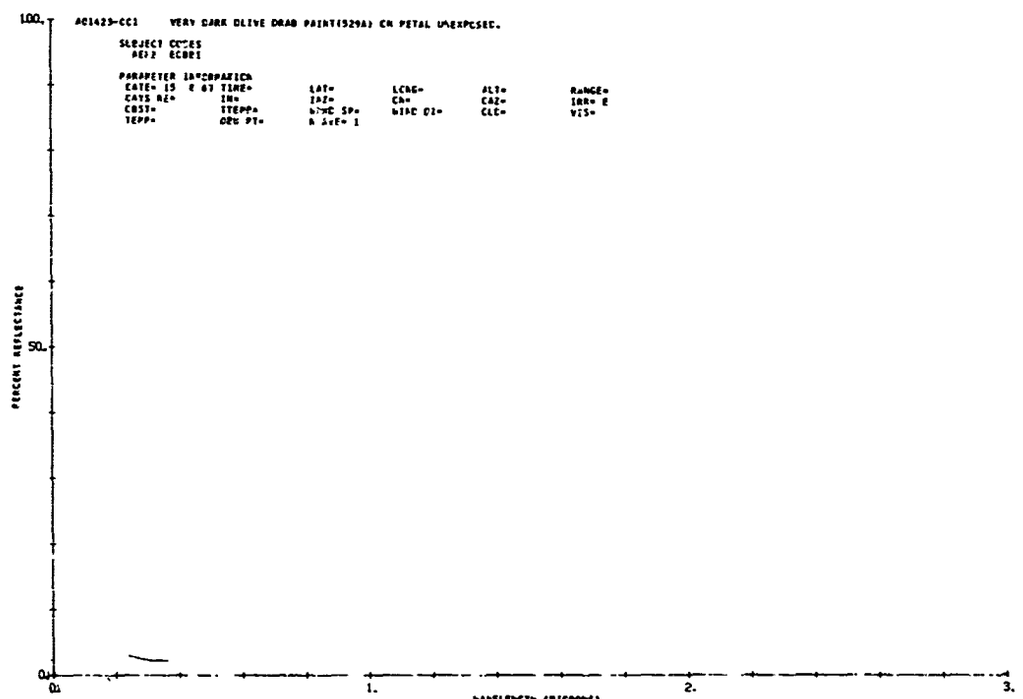
3.
WAVELENGTH (MICRONS)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AC1423-CC1 VERY DARK OLIVE DRAB PAINT(S29A) ON METAL UNEXPOSED.
SUBJECT CODES
PARAMETER INFORMATION
PERCENT REFLECTANCE
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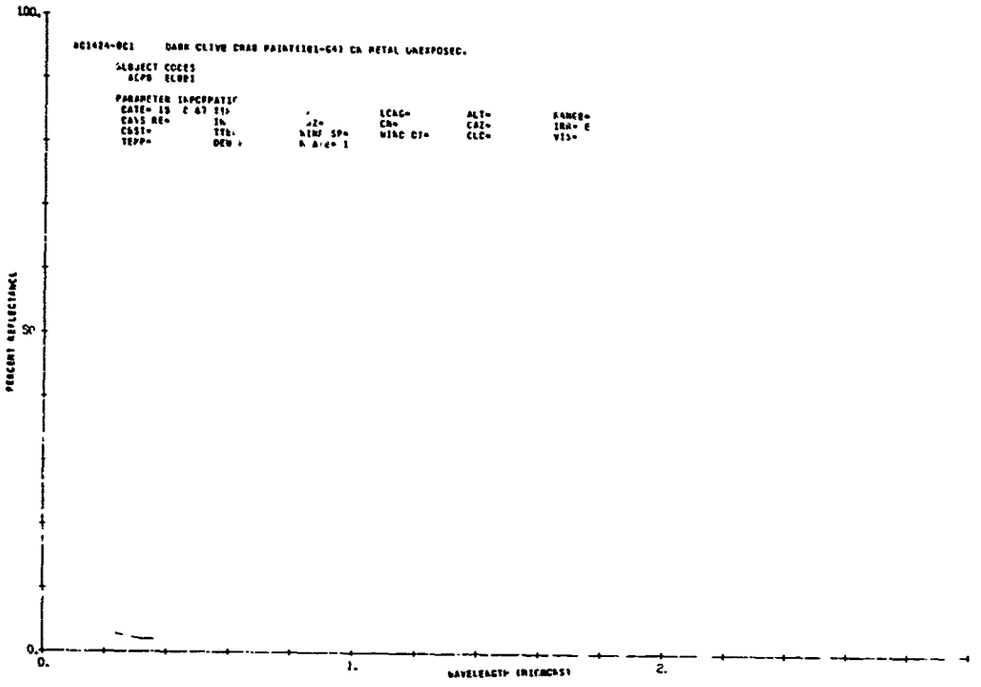
2.
3.
WAVELENGTH (MICRONS)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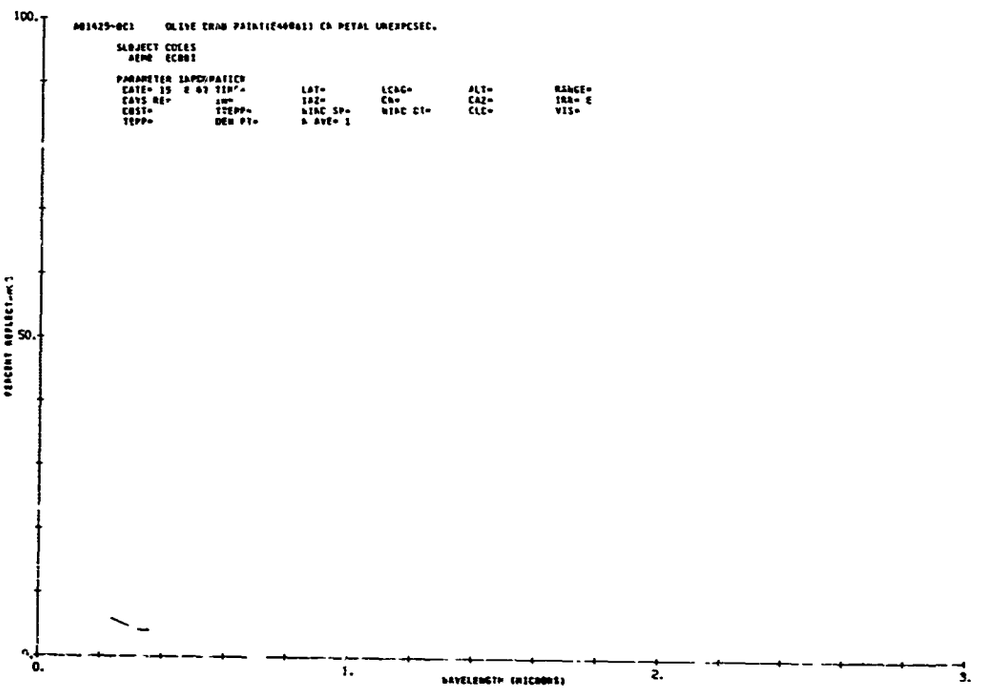
WAVELENGTH (MICRONS)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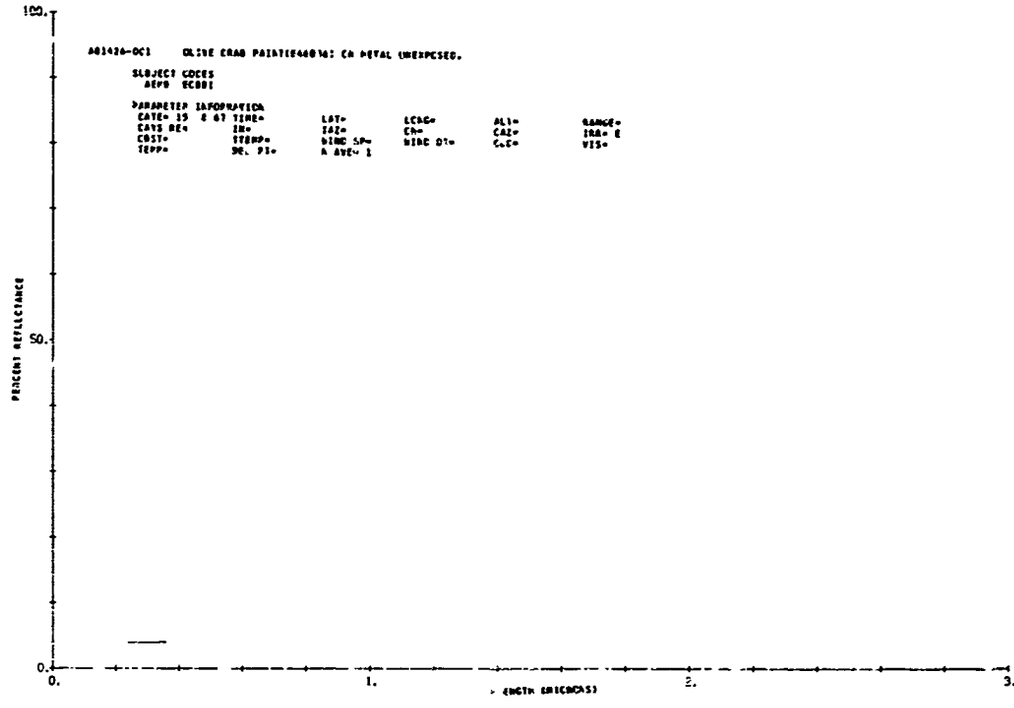
WAVELENGTH (MICRONS)


A01426-OC1 OLIVE DRAB PAINT(E4403): ON METAL UNEXPOSED.
SUBJECT CODES
AEMB ECBBI
PARAMETER INFORMATION
CATE= 15 8 67 TIME= LAT= LONG= ALT= RANGE=
CAYS RE= IN= IAZ= CN= CAZ= IRR= E
CBST= TTEMP= WIND SP= WIND DI= CLC= VIS=
TEMP= DEW PT= N AVE= 1
PERCENT REFLECTANCE
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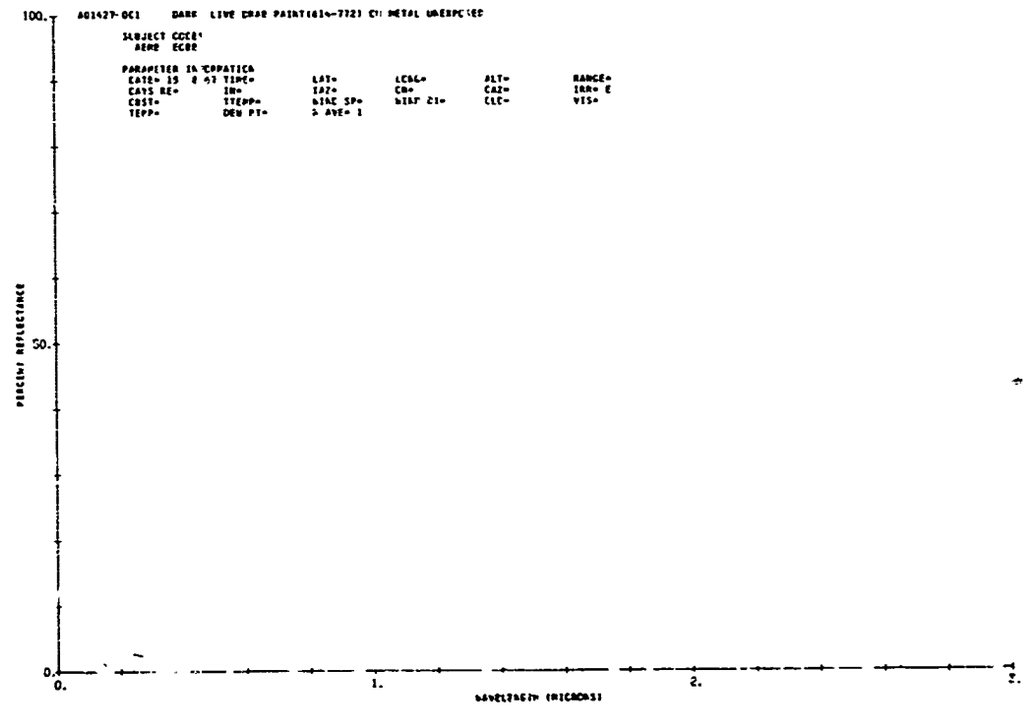
1.
2.
3.
WAVELENGTH (MICRONS)


A01427-OC1 DARK LIVE DRAB PAINT(614-772) ON METAL UNEXPOSED
SUBJECT CODES
AEMB ECBB
PARAMETER INFORMATION
CATE= 15 8 67 TIME= LAT= LONG= ALT= RANGE=
CAYS RE= IN= IAZ= CN= CAZ= IRR= E
CBST= TTEMP= WIND SP= WIND DI= CLC= VIS=
TEMP= DEW PT= N AVE= 1
PERCENT REFLECTANCE
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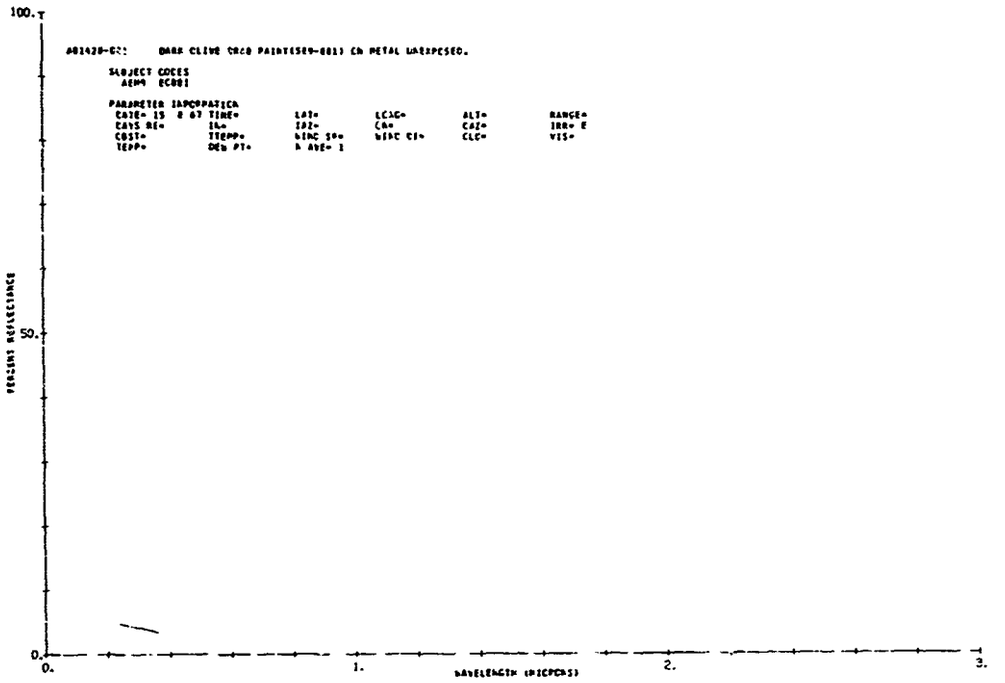
1.
2.
3.
WAVELENGTH (MICRONS)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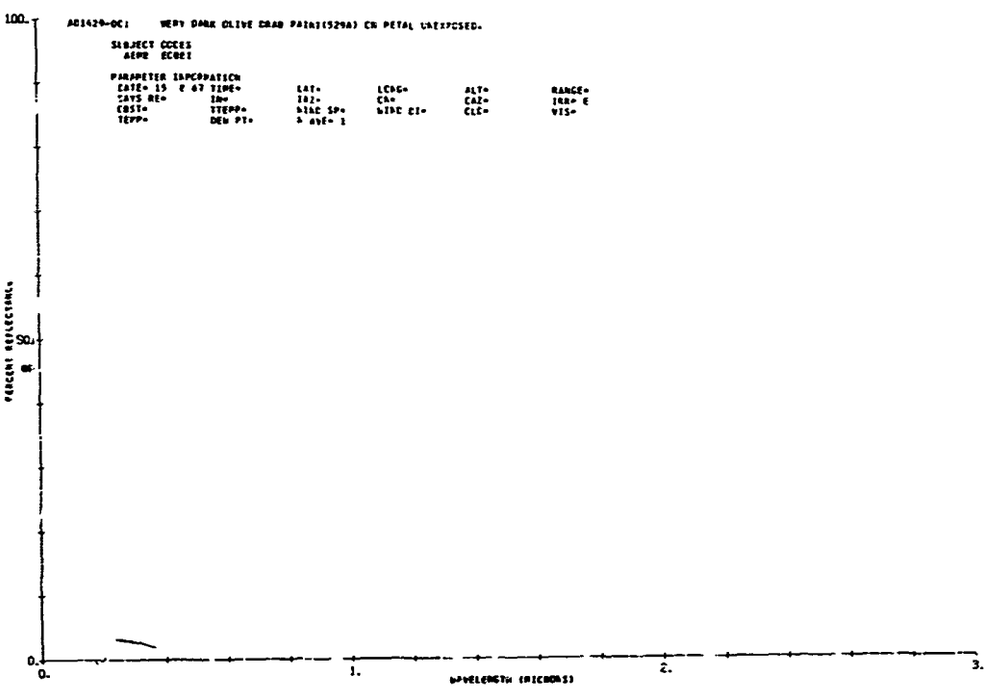
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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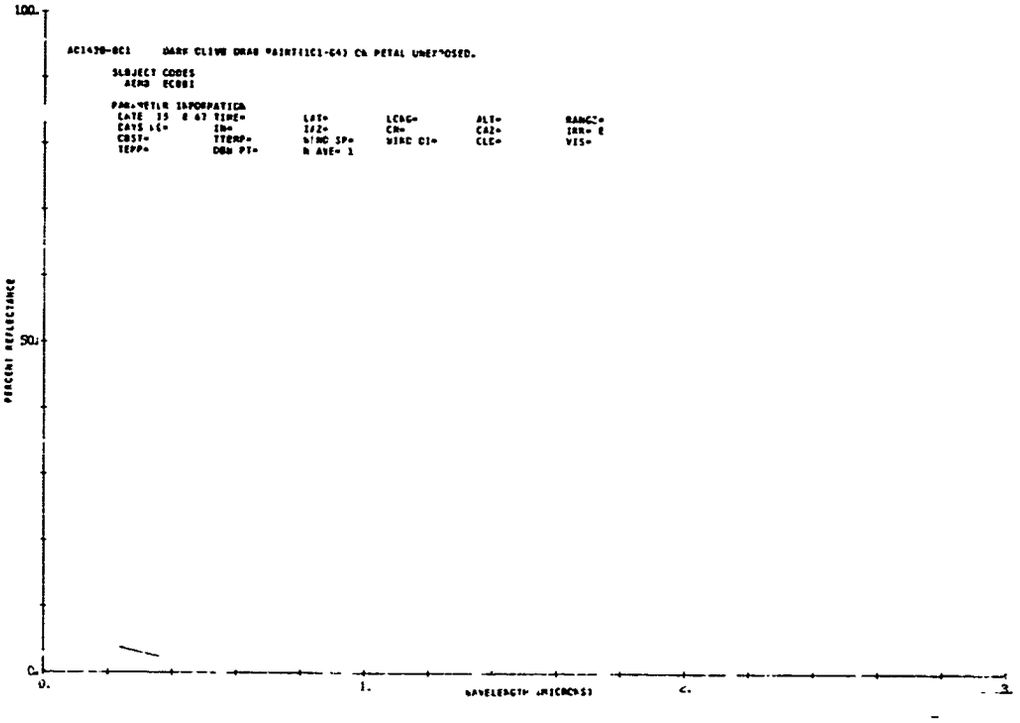
3.
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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PERCENT REFLECTANCE
0.
1.
2.
3
WAVELENGTH (MICRONS)
SUBJECT CODES
PARAMETER INFORMATION
DATE 15 8 67 TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= IAZ= CN= CAZ= IRR= E
CBST= TTEMP= WIND SP= WIND DI= CLC= VIS=
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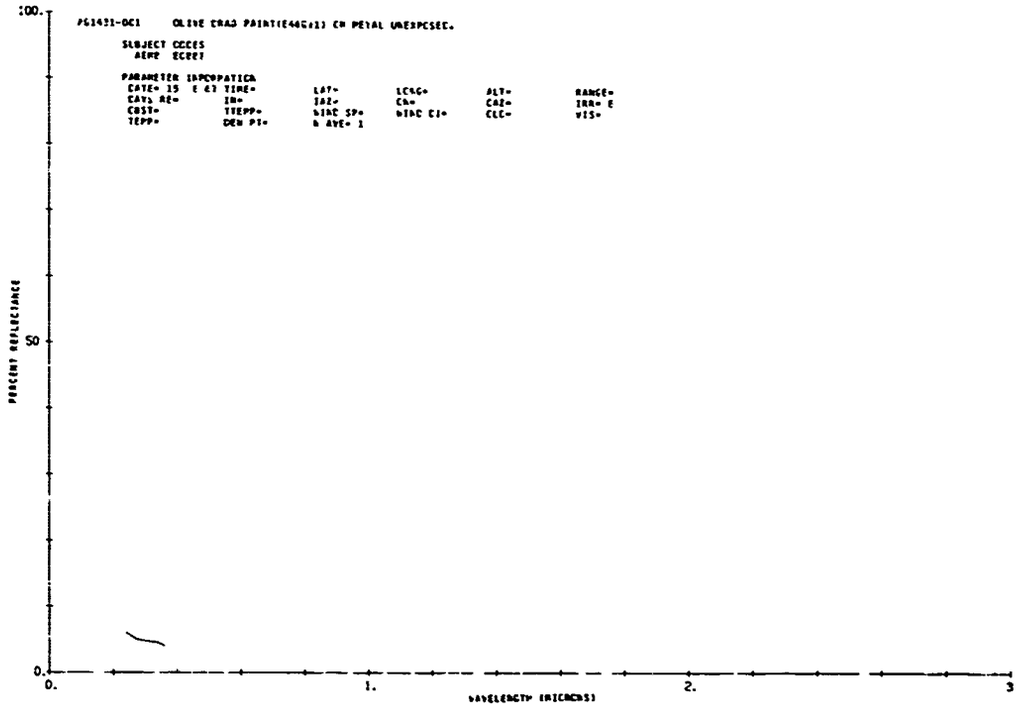
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PERCENT REFLECTANCE
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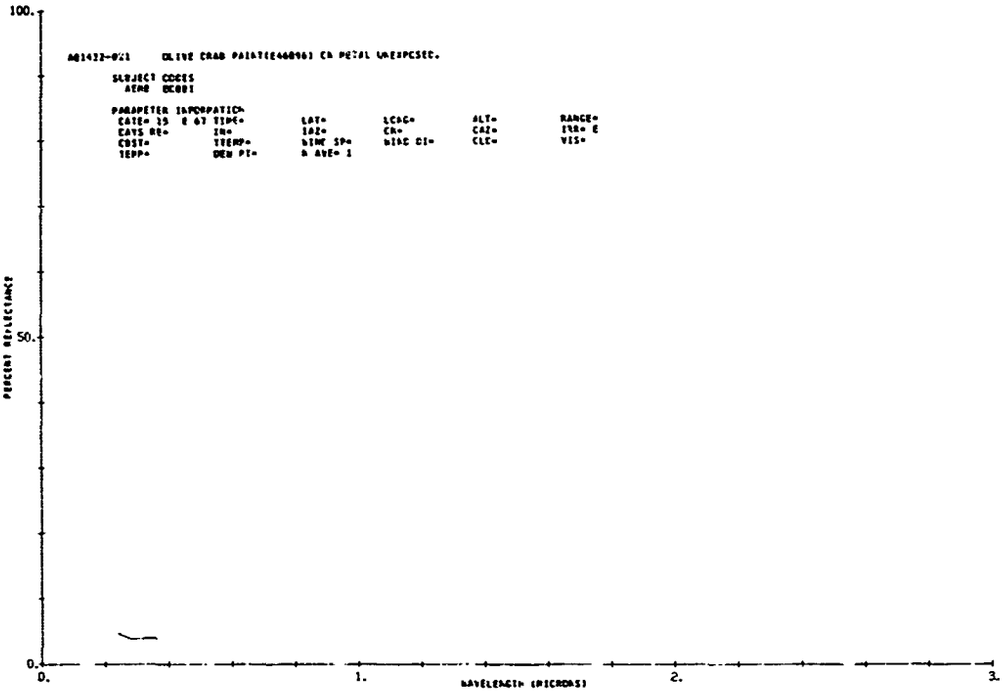
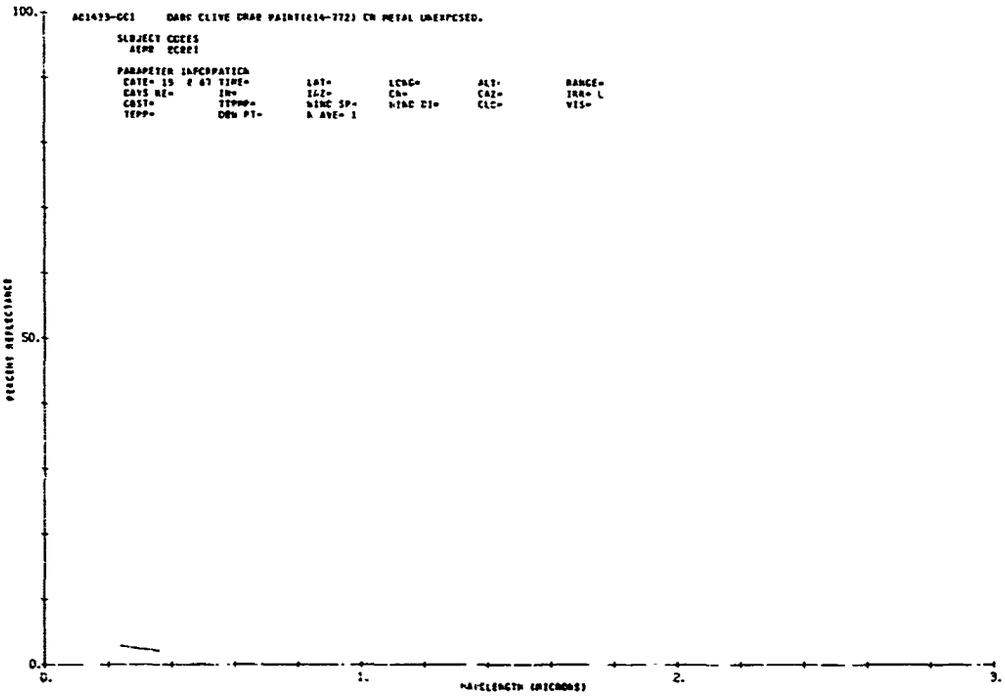
1.
2.
3
WAVELENGTH (MICRONS)
SUBJECT CODES
PARAMETER INFORMATION
DATE= 15 8 67 TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= IAZ= CN= CAZ= IRR= E
CBST= TTEMP= WIND SP= WIND DI= CLC= VIS=
TEPP= DEW PT= N AVE= 1



AE1423-0X1 OLIVE DRAB PAINT(E46096) ON METAL UNEXPOSED.

SUBJECT CODES
AEM8 0C001

PARAMETER INFORMATION
CATE= 15 F 67 TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= IAZ= CA= CAZ= IRR= E
OBST= TEMP= WIND SP= WIND DI= CLC= VIS=
TEMP= DEW PT= # AVE= 1



AE1423-0C1 DARK OLIVE DRAB PAINT(E14-772) ON METAL UNEXPOSED.

SUBJECT CODES
AEM8 0C001

PARAMETER INFORMATION
CATE= 15 F 67 TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= IAZ= CA= CAZ= IRR= L
OBST= TEMP= WIND SP= WIND DI= CLC= VIS=
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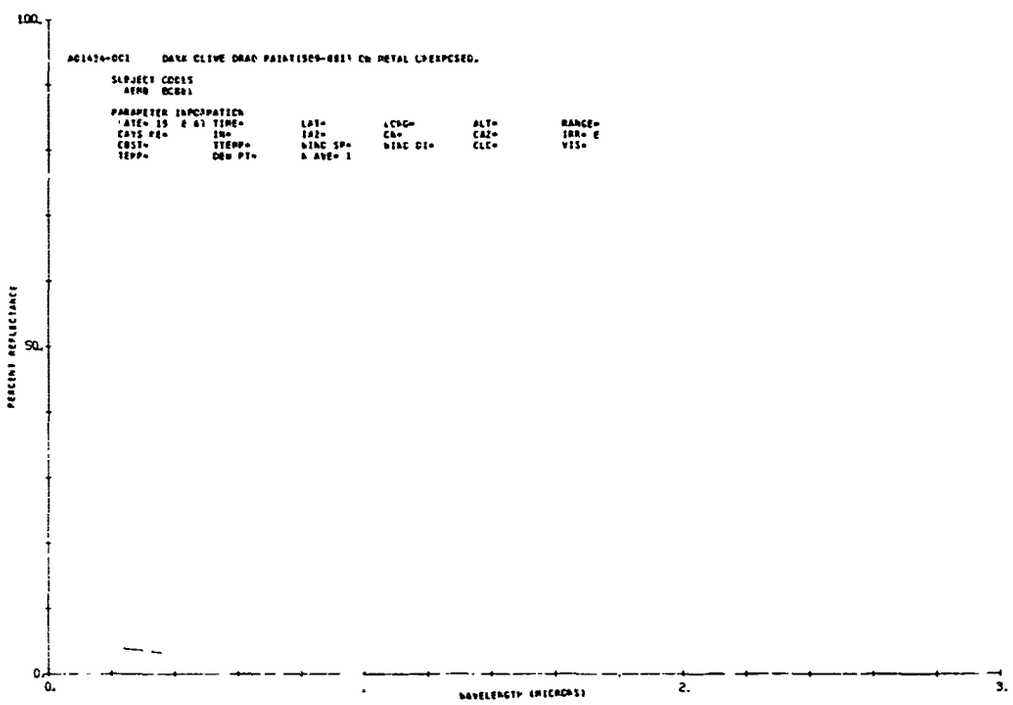
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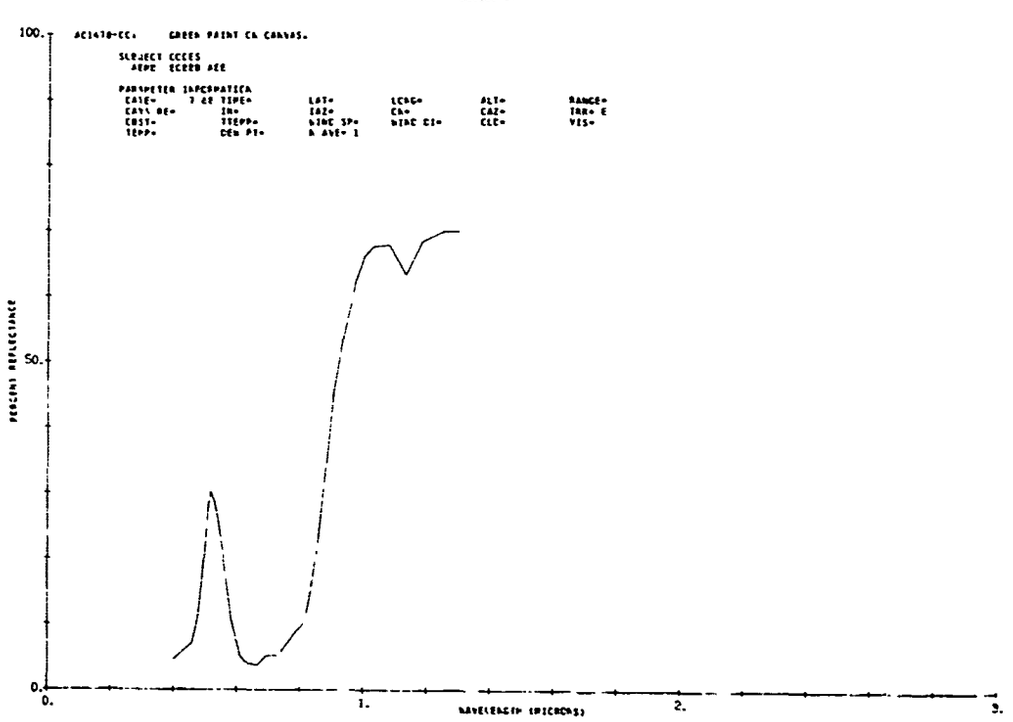
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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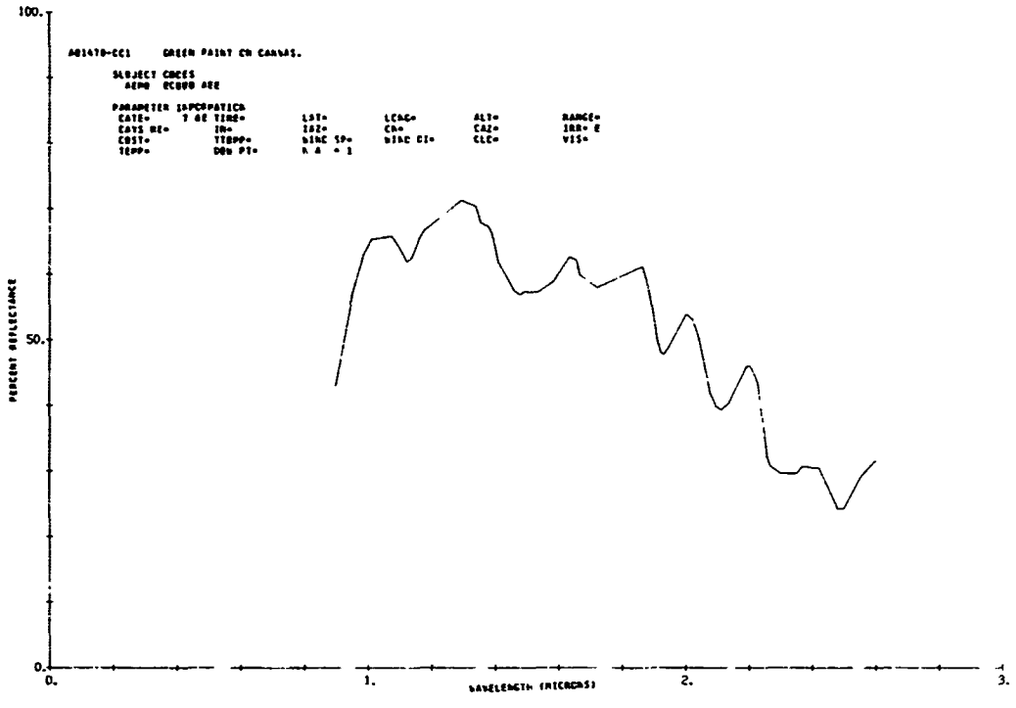
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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PERCENT REFLECTANCE
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1.
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3.
WAVELENGTH (MICRONS)
GREEN PAINT ON CANVAS.
SUBJECT CODES
PARAMETER INFORMATION
DATE=
DAYS RE=
COST=
TEMP=
TIME=
IN=
TTEMP=
DEW PT=
LAT=
IAZ=
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CN=
WIND DI=
ALT=
CAZ=
CLC=
RANGE=
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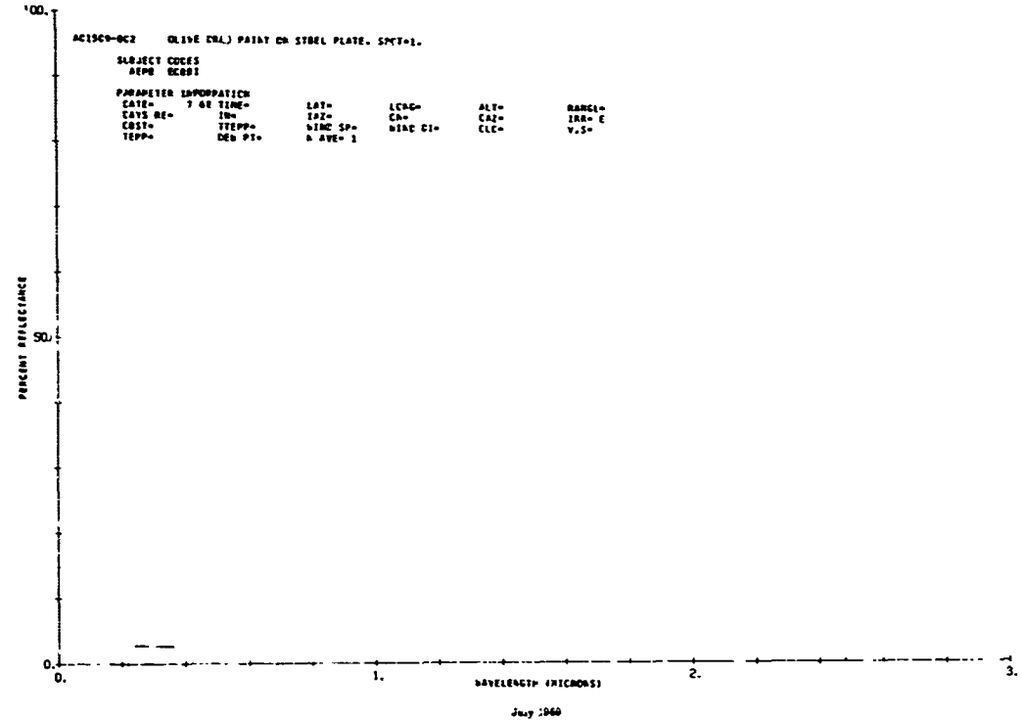
VIS=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PERCENT REFLECTANCE
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1.
2.
3.
WAVELENGTH (MICRONS)
OLIVE DRAB PAINT ON STEEL PLATE. SPCT=1.
SUBJECT CODES
PARAMETER INFORMATION
DATE=
DAYS RE=
COST=
TEMP=
TIME=
IN=
TTEMP=
DEW PT=
LAT=
IAZ=
WIND SP=
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LONG=
CN=
WIND DI=
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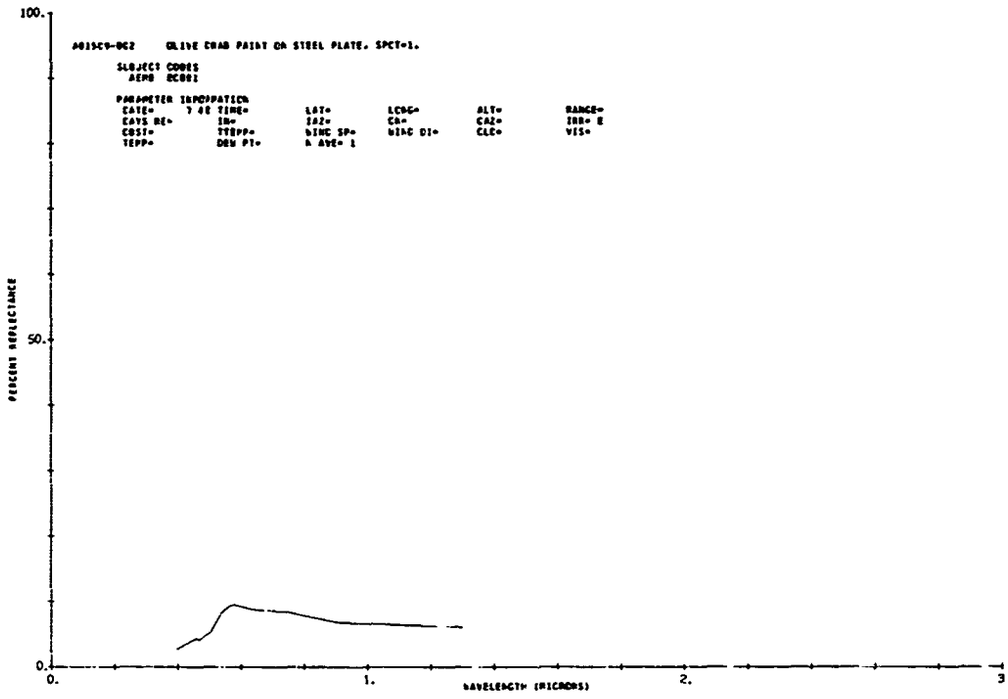
CAZ=
CLC=
RANGE=
IRR= E
V.S=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AG15C9-0C2 OLIVE DRAB PAINT ON STEEL PLATE. SPCT=1.
SUBJECT CODES
AEMB EC001
PARAMETER INFORMATION
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CAYS RE= IN=
OBST= TTEMP=
TEMP= DEW PT=
LAT= LONG= ALT= RANGE=
IAZ= CH= CAZ= IRR= E
WIND SP= WIND DI= CLE= VIS=
A AVE= 1
PERCENT REFLECTANCE
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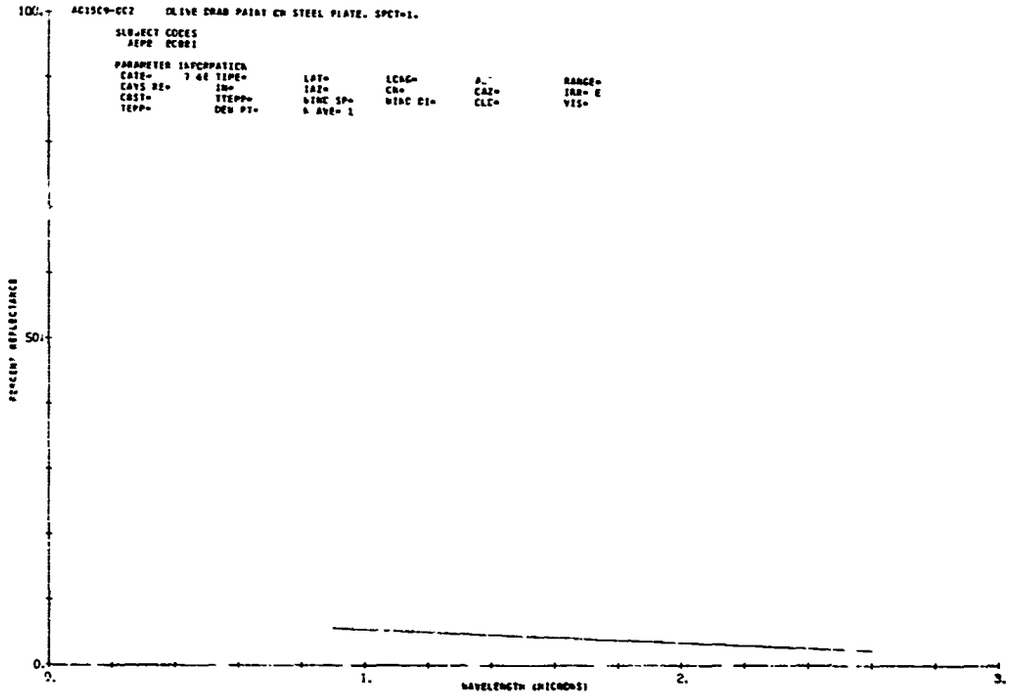
1.
2.
3
WAVELENGTH (MICRONS)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AG15C9-0C2 OLIVE DRAB PAINT ON STEEL PLATE. SPCT=1.
SUBJECT CODES
AEMB EC001
PARAMETER INFORMATION
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CAYS RE= IN=
OBST= TTEMP=
TEMP= DEW PT=
LAT= LONG= A.- RANGE=
IAZ= CH= CAZ= IRR= E
WIND SP= WIND DI= CLE= VIS=
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PERCENT REFLECTANCE
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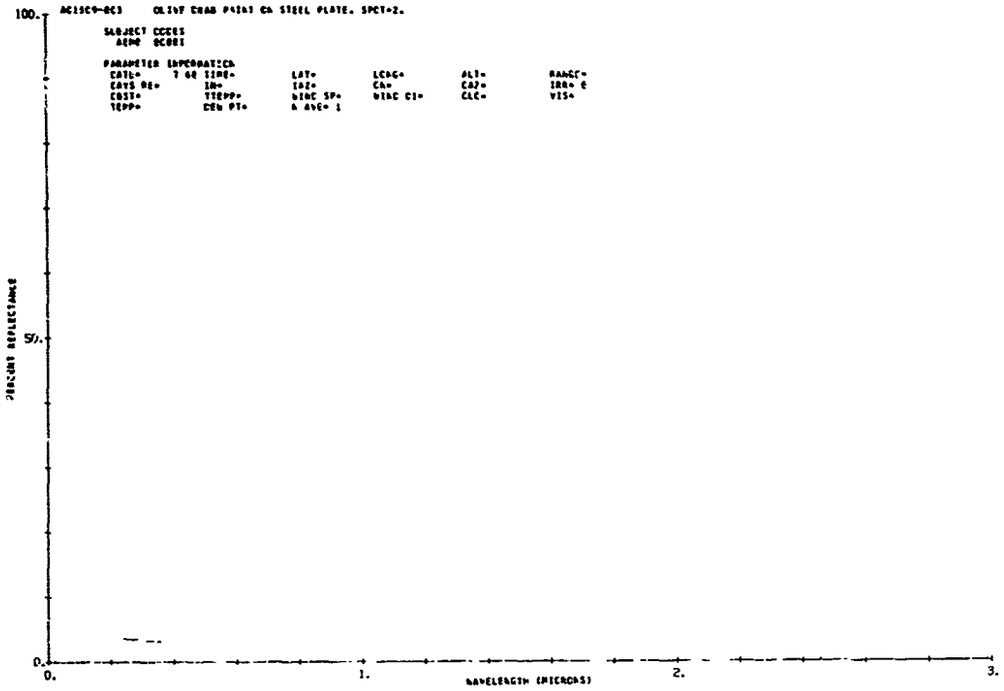
WAVELENGTH (MICRONS)


AG15C9-0C3 OLIVE DRAB PAINT ON STEEL PLATE. SPCT=2.
SUBJECT CODES
AEMP 0C001
PARAMETER INFORMATION
DATE= 7 68 TIME= LAT= LONG= ALT= RANGE=
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COST= TTEMP= WIND SP= WIND DI= CLC= VIS=
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PERCENT REFLECTANCE
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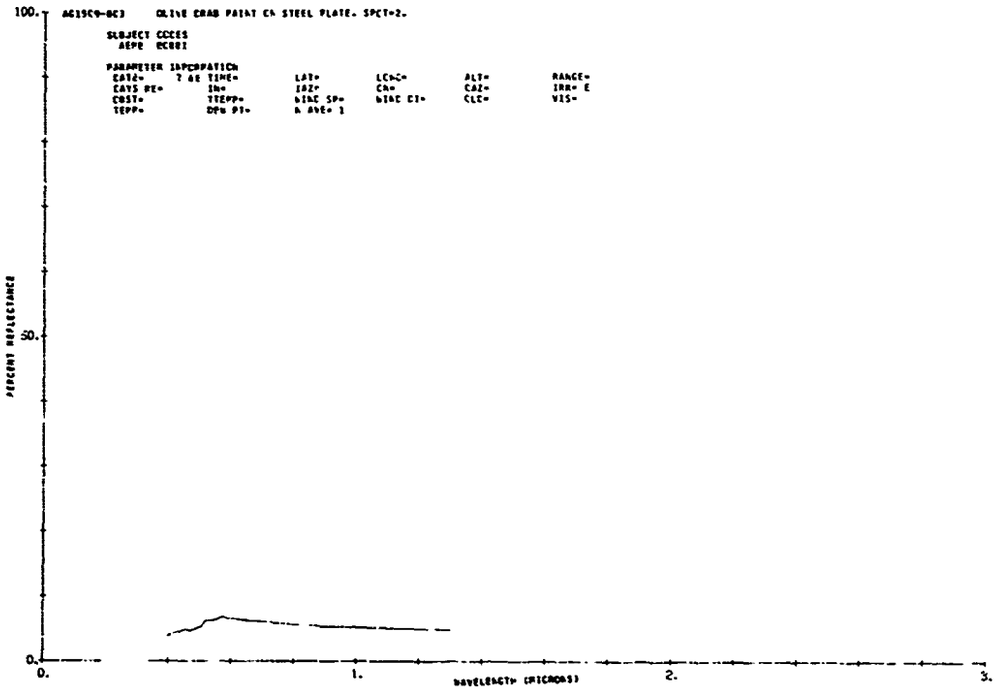
WAVELENGTH (MICRONS)


AG15C9-0C3 OLIVE DRAB PAINT ON STEEL PLATE. SPCT=2.
SUBJECT CODES
AEMP 0C001
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DATE= 7 68 TIME= LAT= LONG= ALT= RANGE=
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COST= TTEMP= WIND SP= WIND DI= CLC= VIS=
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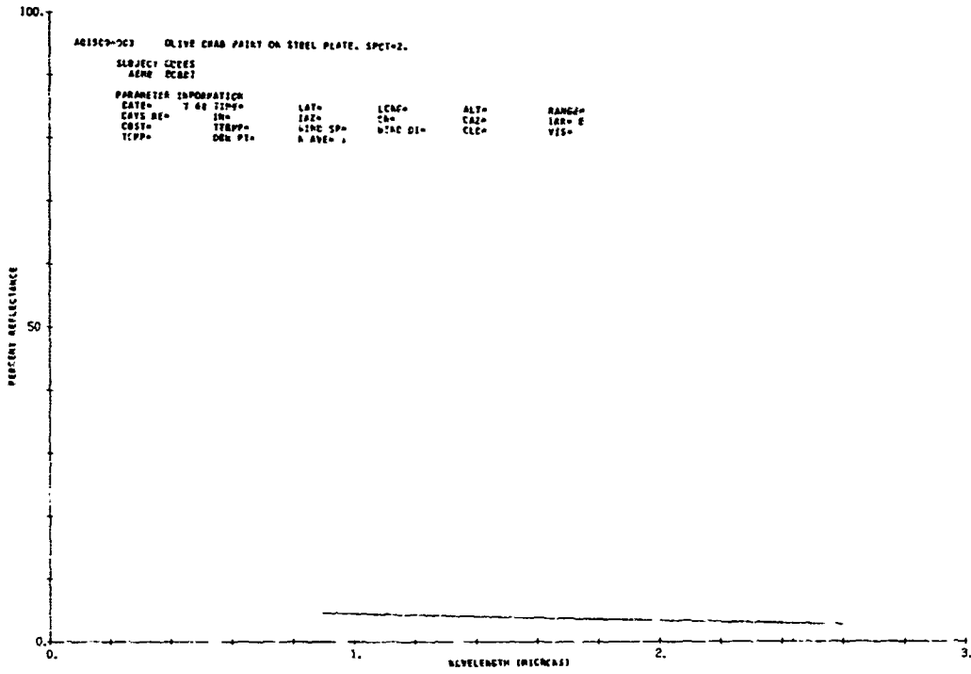
WAVELENGTH (MICRONS)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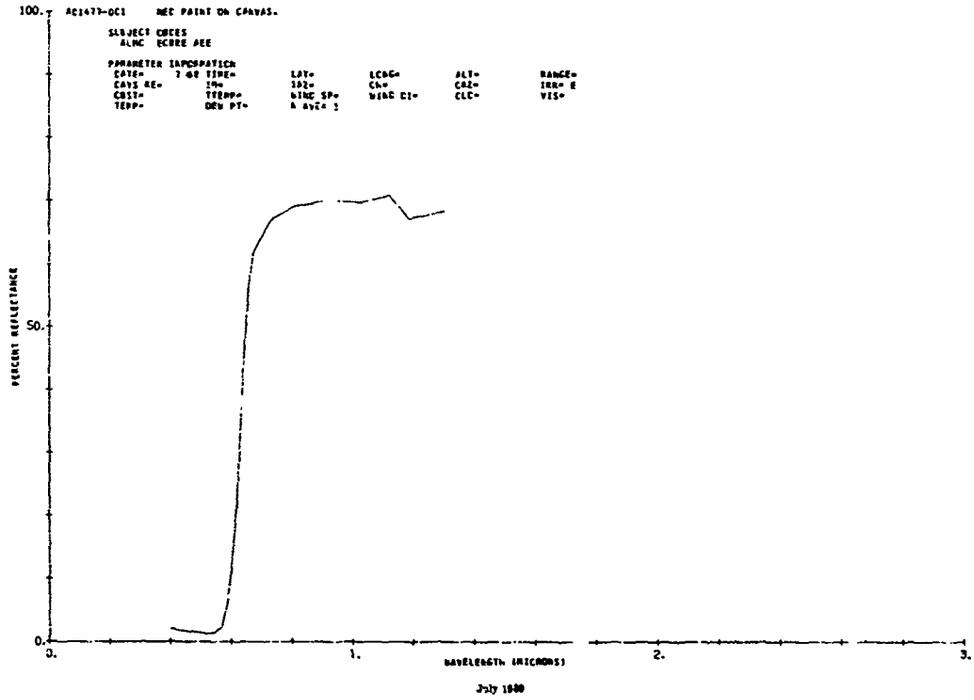
WAVELENGTH (MICRONS)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2.
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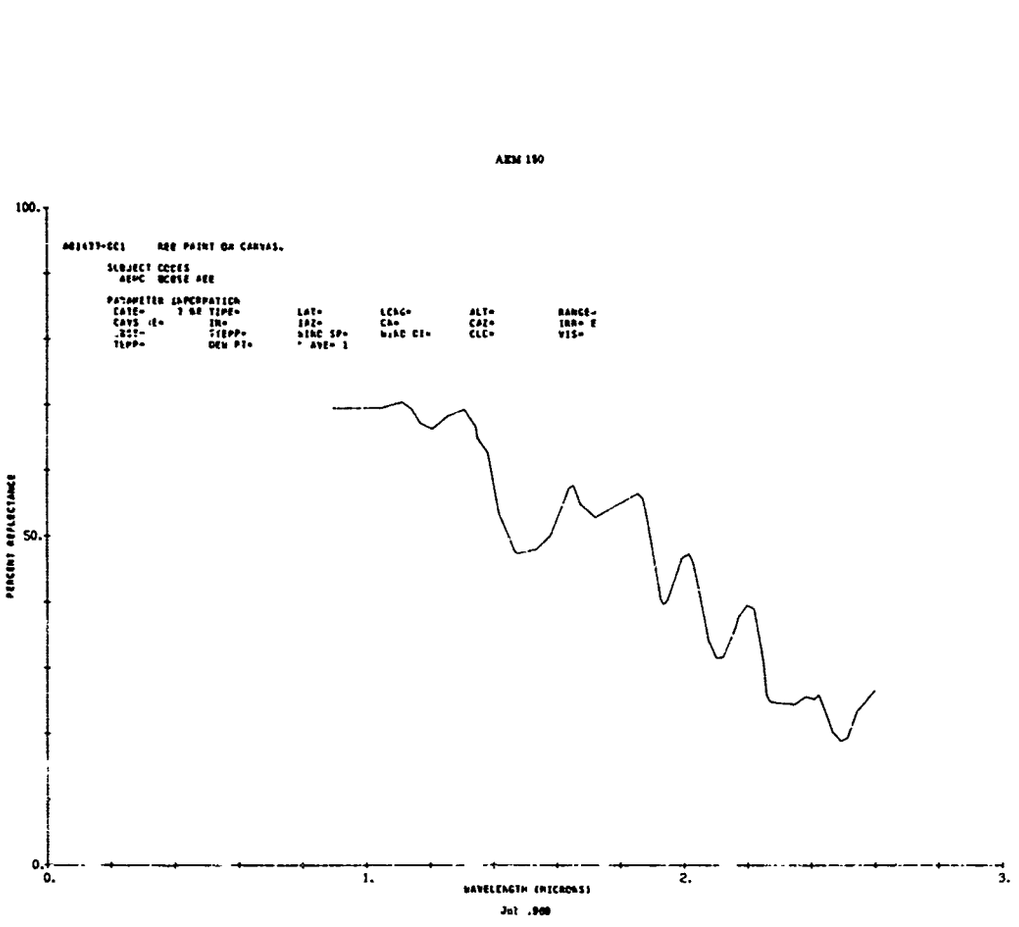
WAVELENGTH (MICRONS)

AEM 190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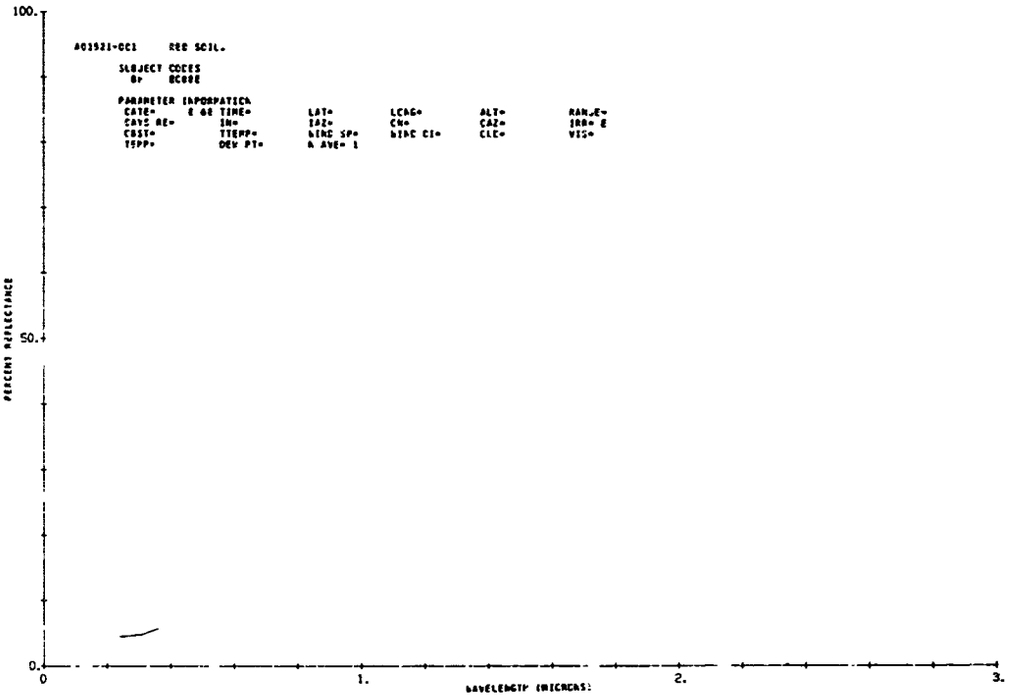
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)
Jul .000



AG1521-CC1 REE SOIL.

SUBJECT CODES
BF EC88E

PARAMETER INFORMATION
CATE= E OF TIME= LAT= LONG= ALT= RANGE=
DAYS RE= IN= IAZ= CH= CAZ= IFA= E
CBST= TTEMP= WIRC SP= WIRC DI= CLE= VIS=
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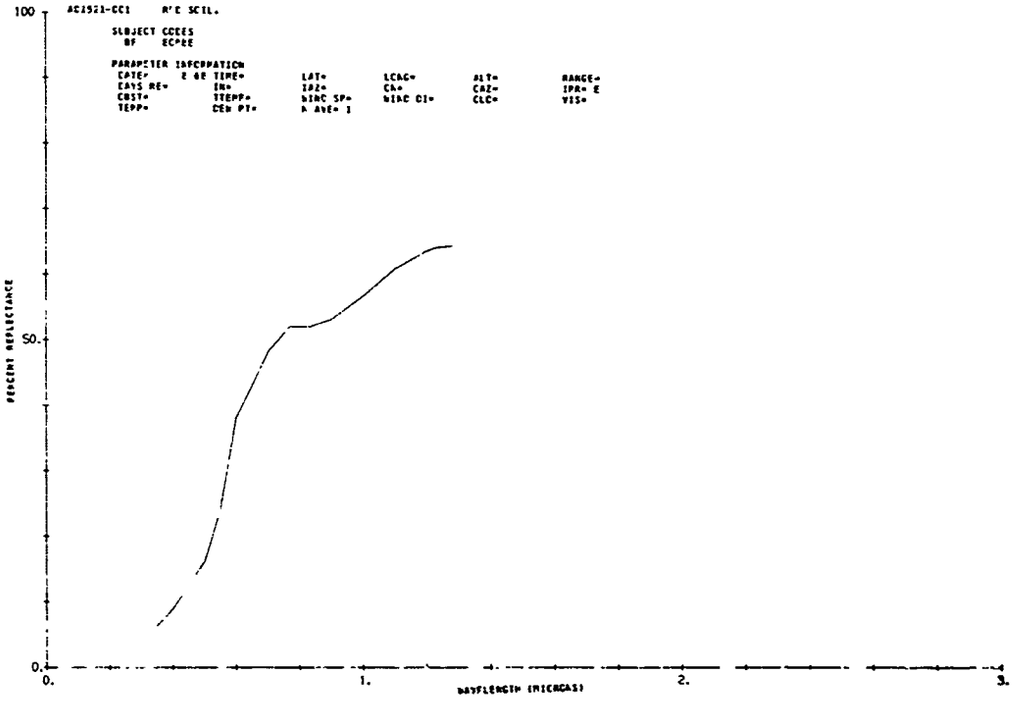

AG1521-CC1 REE SOIL.

SUBJECT CODES
BF EC88E

PARAMETER INFORMATION
CATE= E OF TIME= LAT= LONG= ALT= RANGE=
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CBST= TTEMP= WIRC SP= WIRC DI= CLE= VIS=
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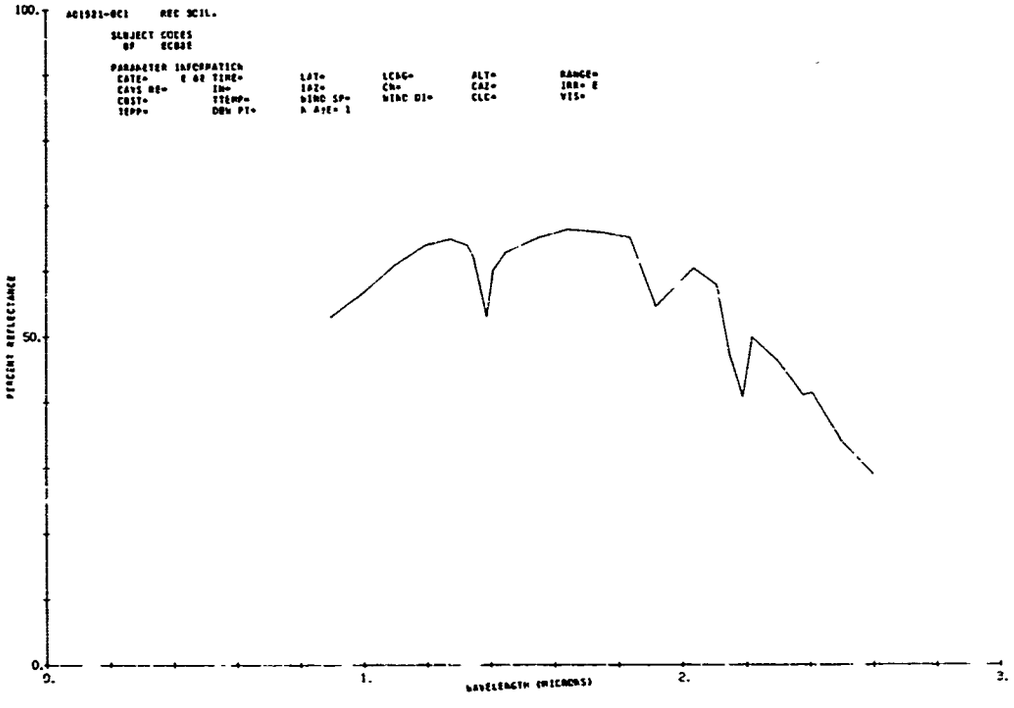
AG1521-0C1 REC SCIL.
SUBJECT CODES
BP ECB3E
PARAMETER INFORMATION
DATE= E AE TIME= LAT= LONG= ALT= RANGE=
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OBST= TEMP= WIND SP= WIND DI= CLE= VIS=
TEMP= DEW PT= A AVE= 1
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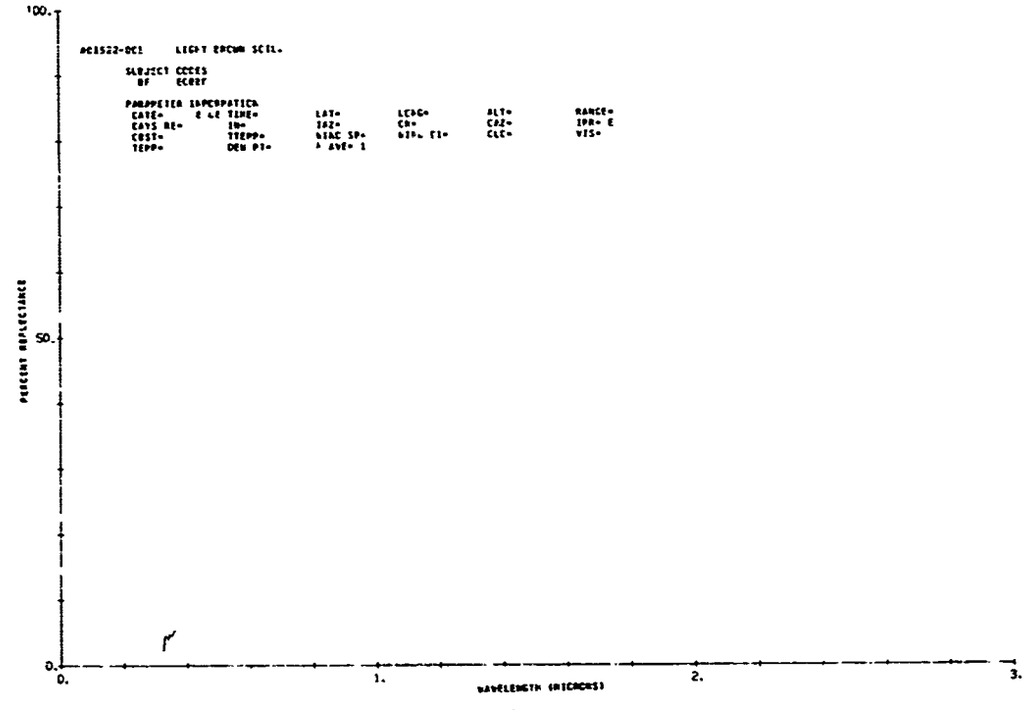
1.
2.
3.
WAVELENGTH (MICRONS)


AG1522-0C1 LIGHT BROWN SCIL.
SUBJECT CODES
BP ECB3F
PARAMETER INFORMATION
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DAYS RE= IN= IAZ= CN= CAZ= IRR= E
OBST= TEMP= WIND SP= WIND DI= CLE= VIS=
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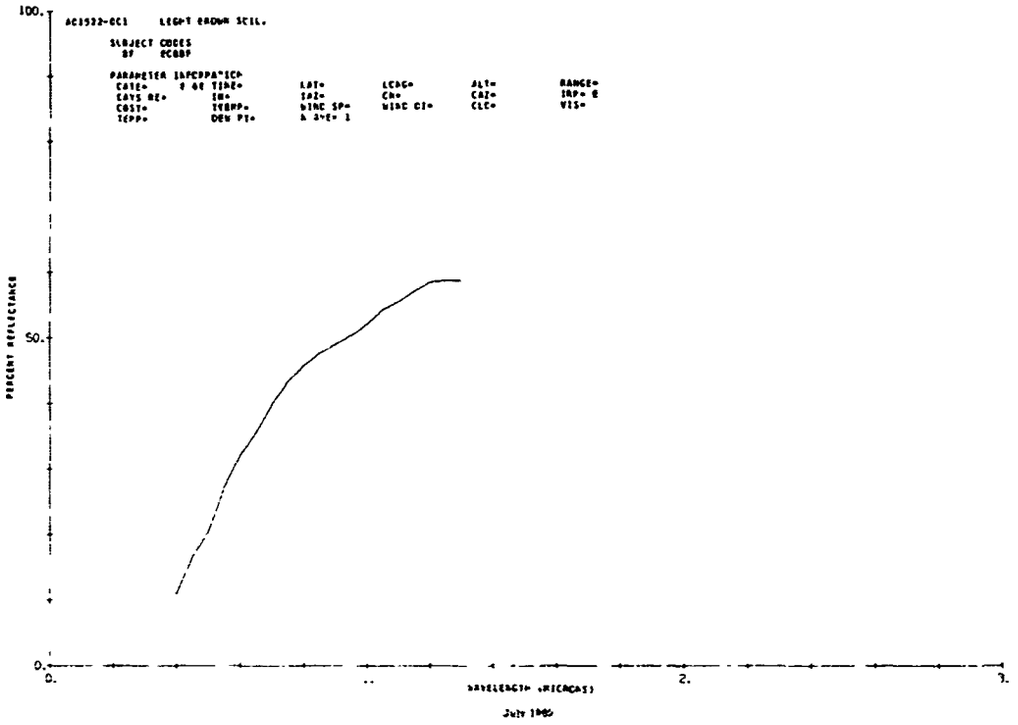
1.
2.
3.
WAVELENGTH (MICRONS)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AC1532-0C1 LEGHT BROWN SOIL.
SUBJECT CODES
BF 0C08F
PARAMETER INFORMATION
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PERCENT REFLECTANCE
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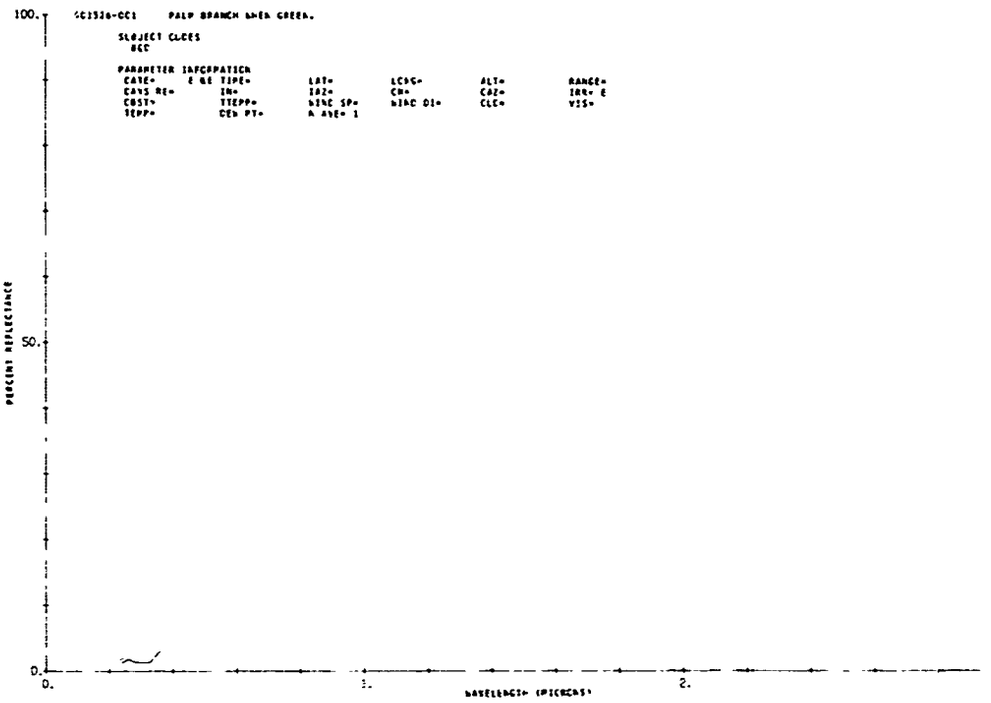
2.
3.
WAVELENGTH (MICRONS)

July 1980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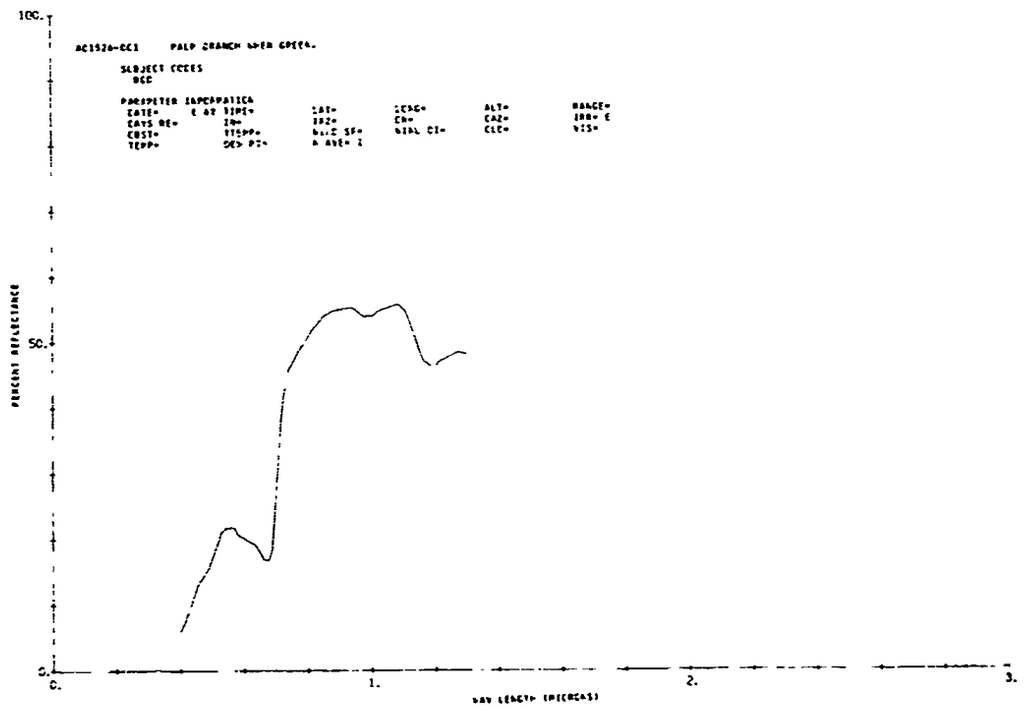
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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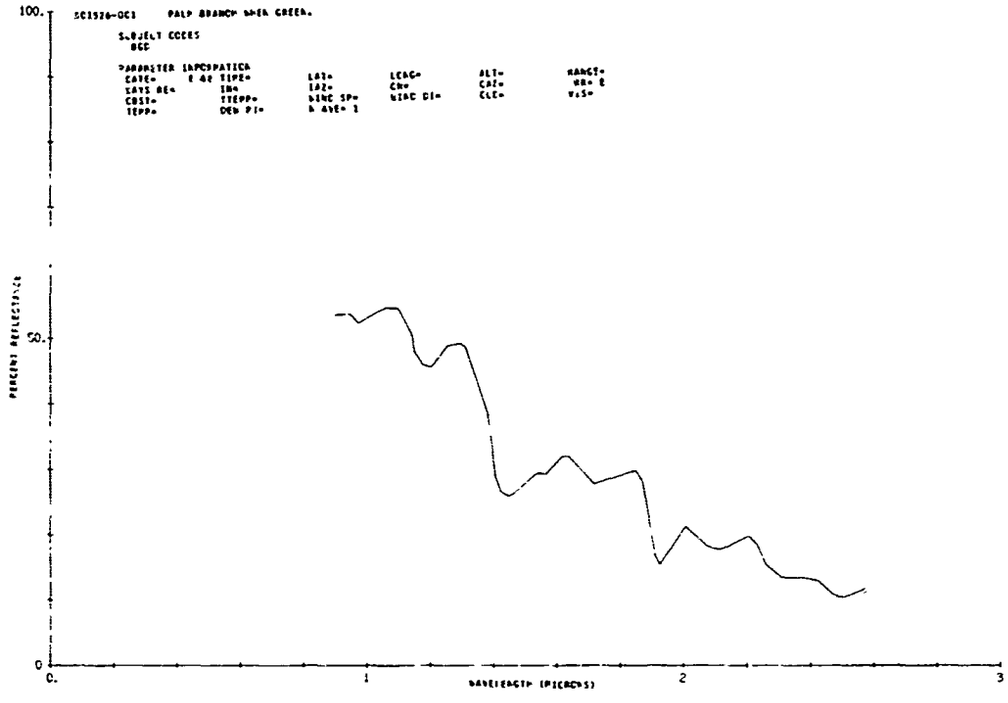
3.
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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CBST= TTEMP=
TEMP= DEW PT=
LAT= LONG= ALT= RANGE=
IAZ= CW= CAZ= WB= E
WIND SP= WIND DI= CLE= W.S=
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PERCENT REFLECTANCE
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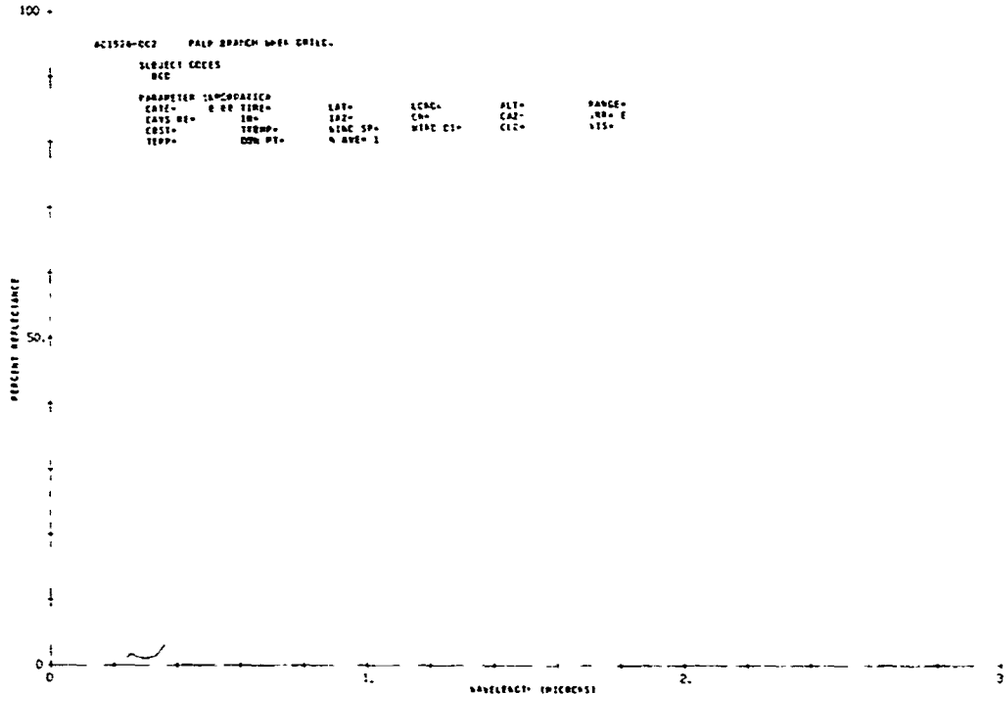
WAVELENGTH (MICRONS)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WIND SP= WIND DI= CLE= W.S=
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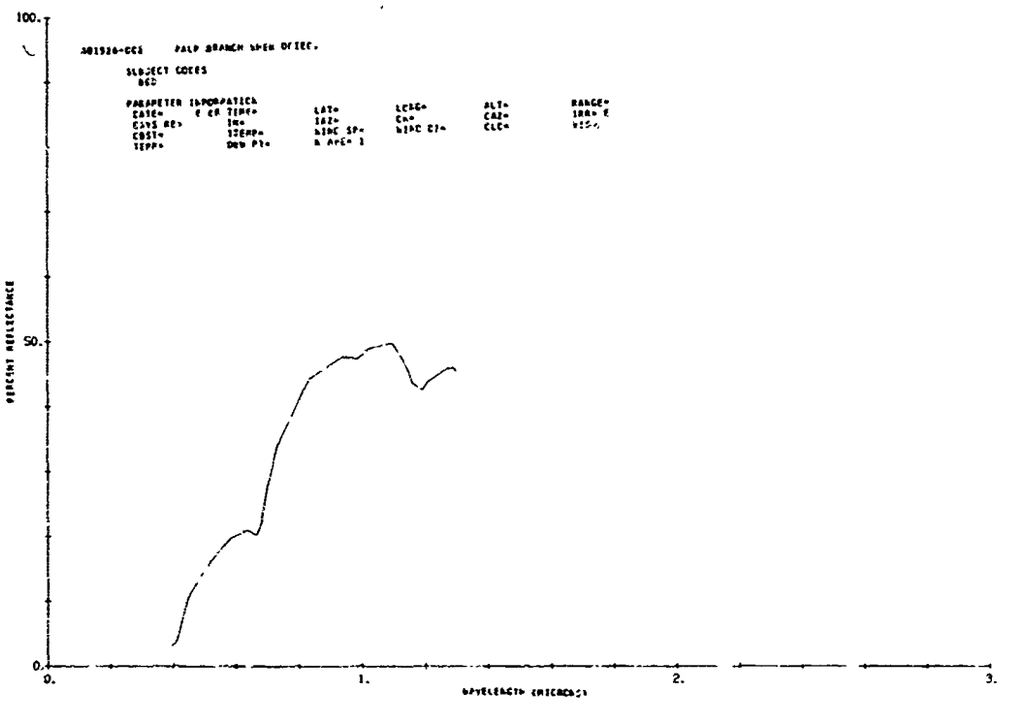
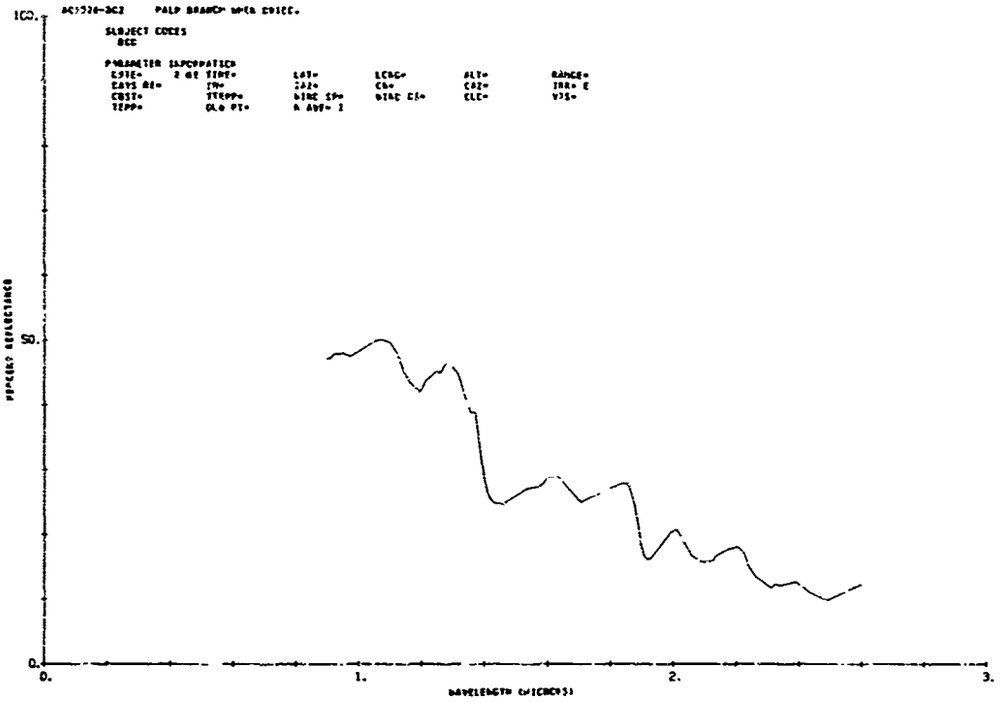
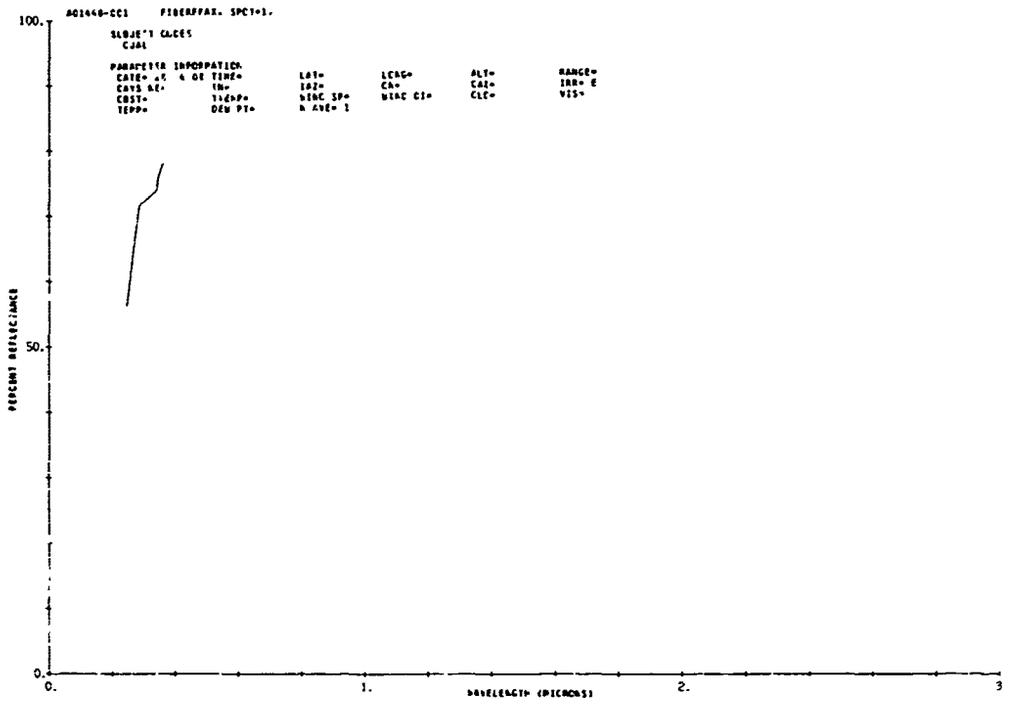
3
WAVELENGTH (MICRONS)

BGD 413





July 1980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LAT= LONG= ALT= RANGE=
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WIND SP= WIND DI= CLC= VIS=
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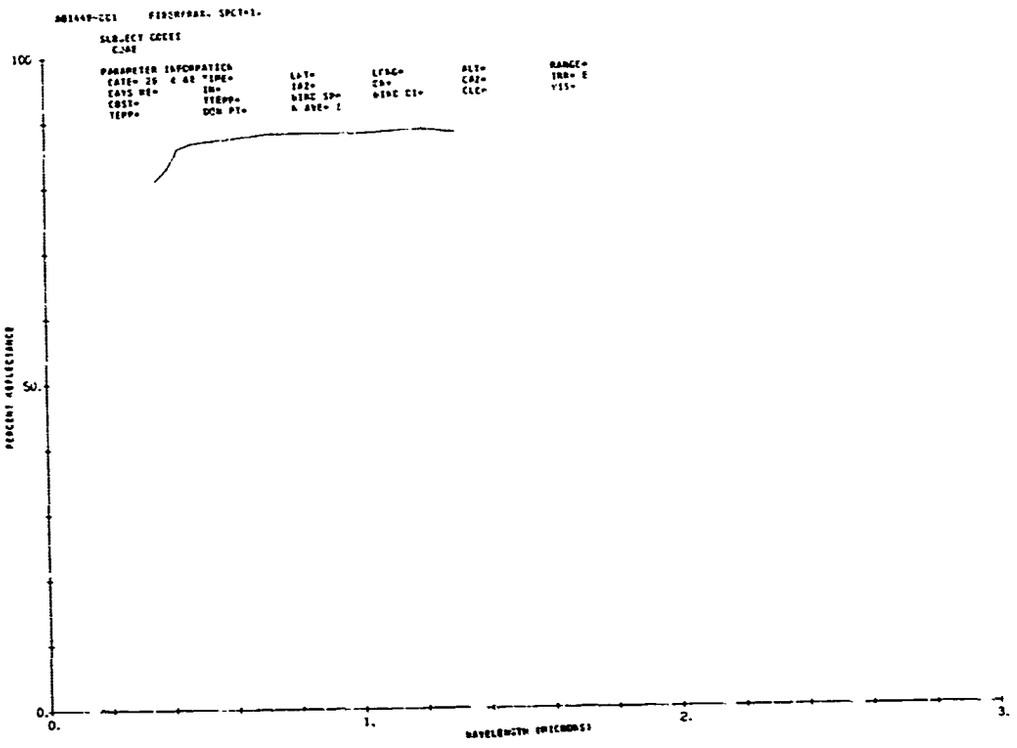
WAVELENGTH (MICRONS)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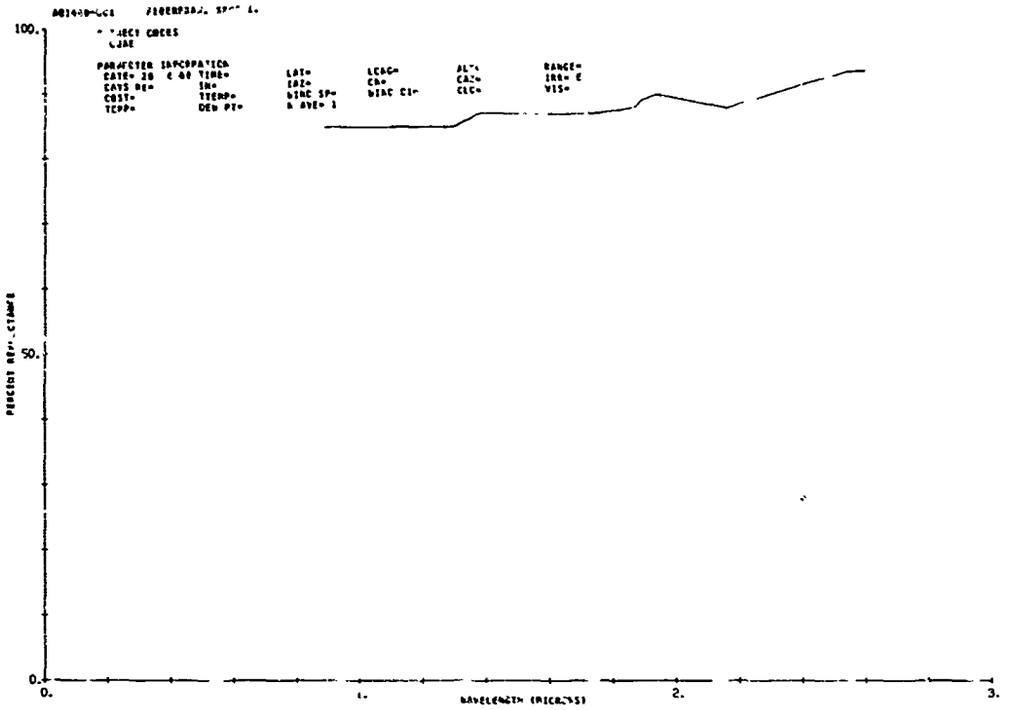
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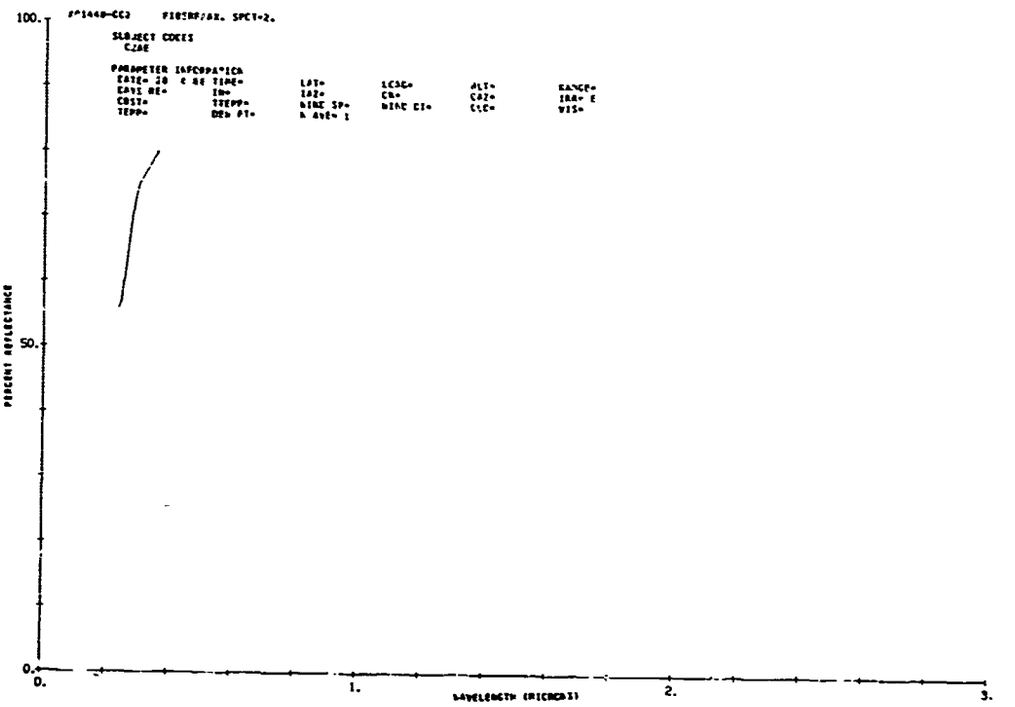
WAVELENGTH (MICRONS)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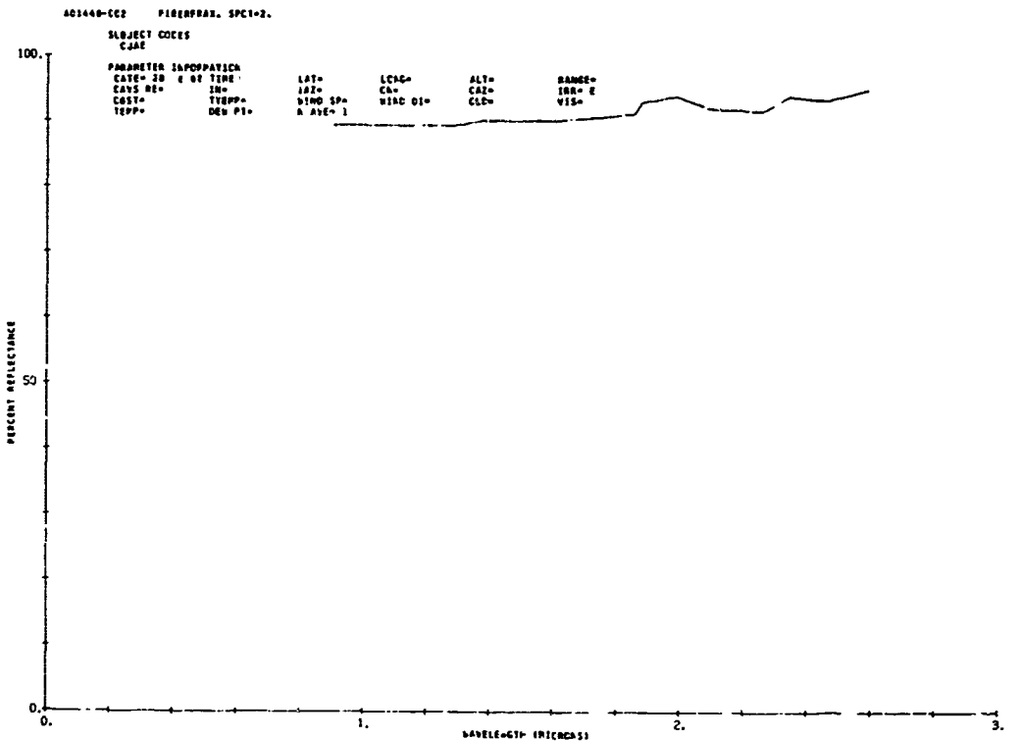
WAVELENGTH (MICRONS)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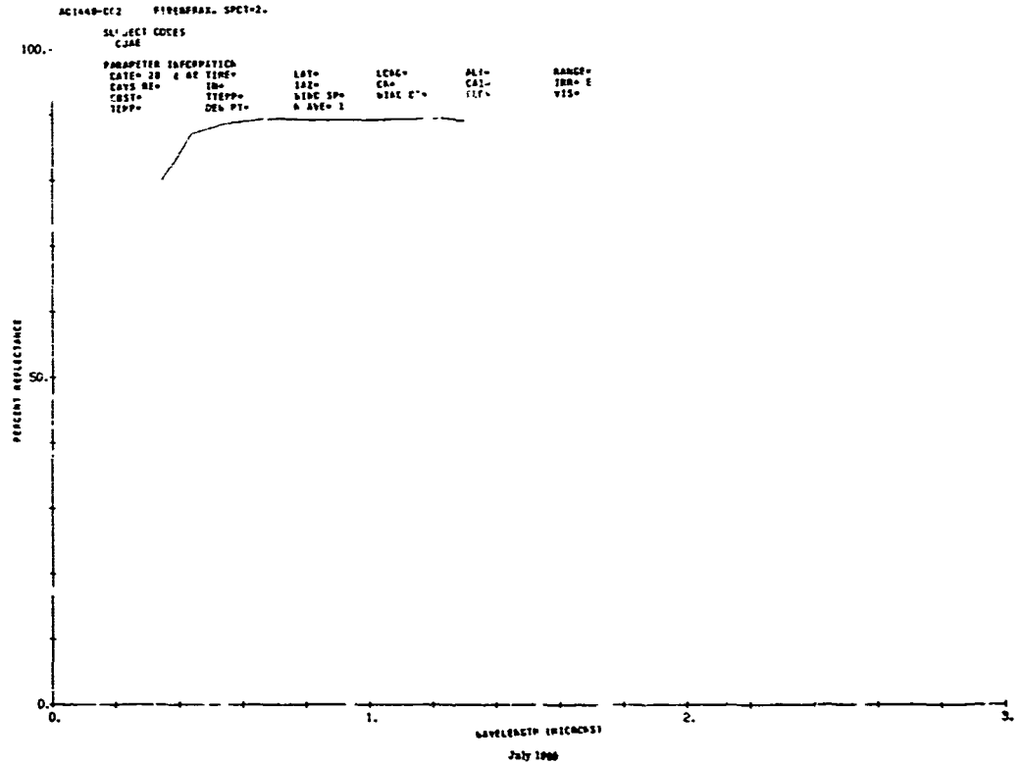
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SUBJECT CODES
CJAE
PARAMETER INFORMATION
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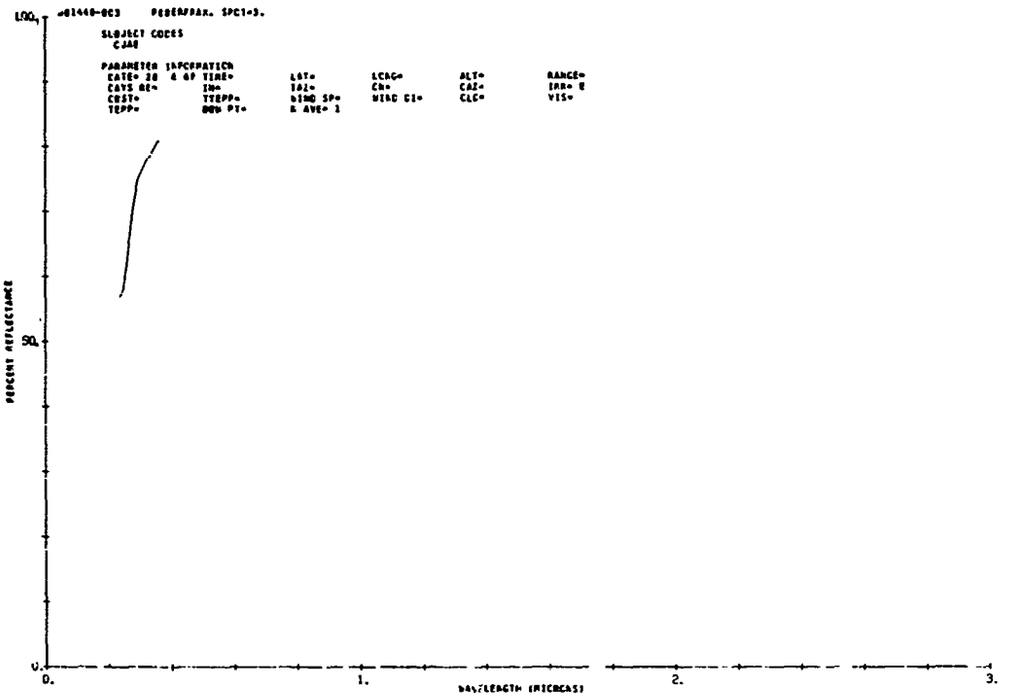
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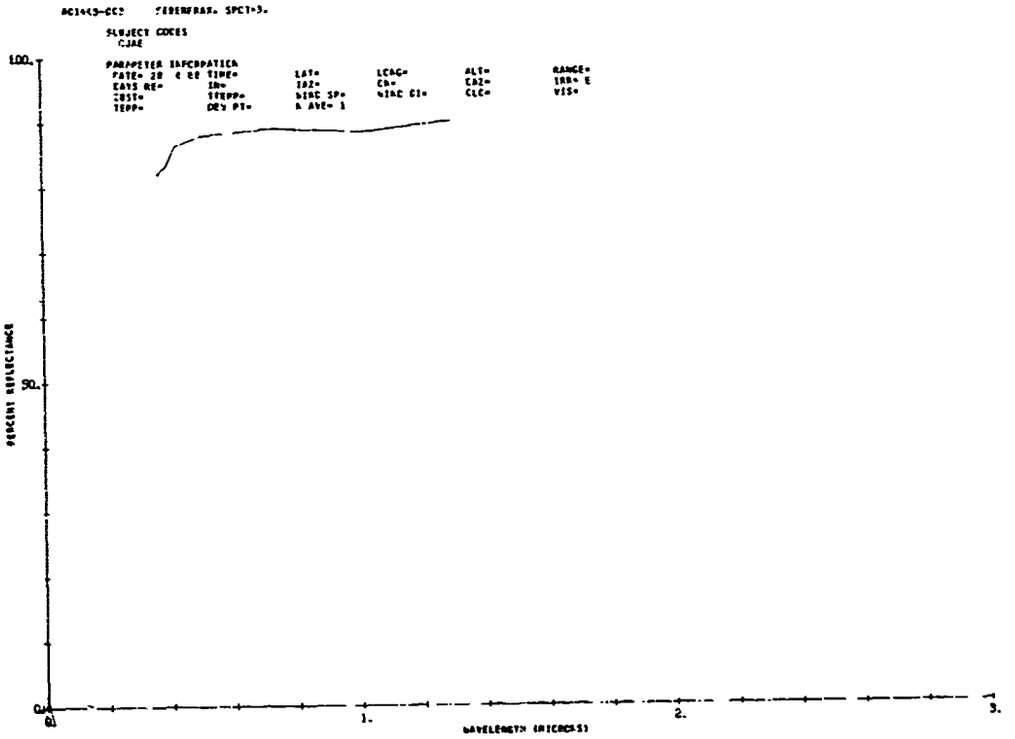
WAVELENGTH (MICRONS)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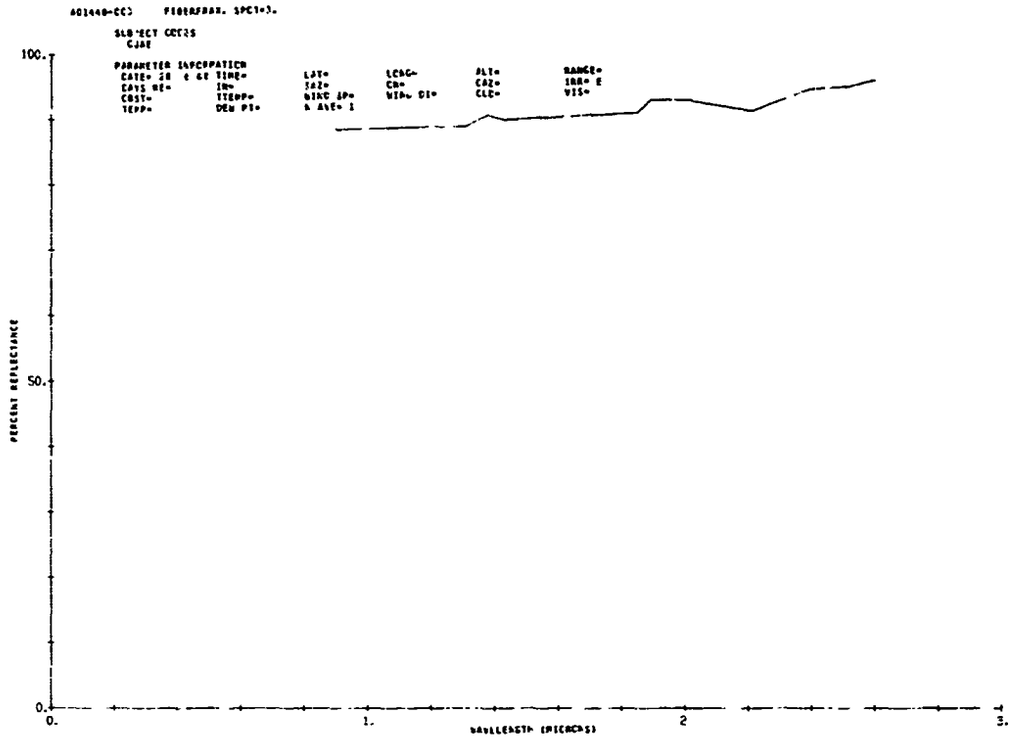
WAVELENGTH (MICRONS)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DEW PT=
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CH=
WIND DI=
ALT=
CAZ=
CLE=
RANGE=
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VIS=
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PERCENT REFLECTANCE
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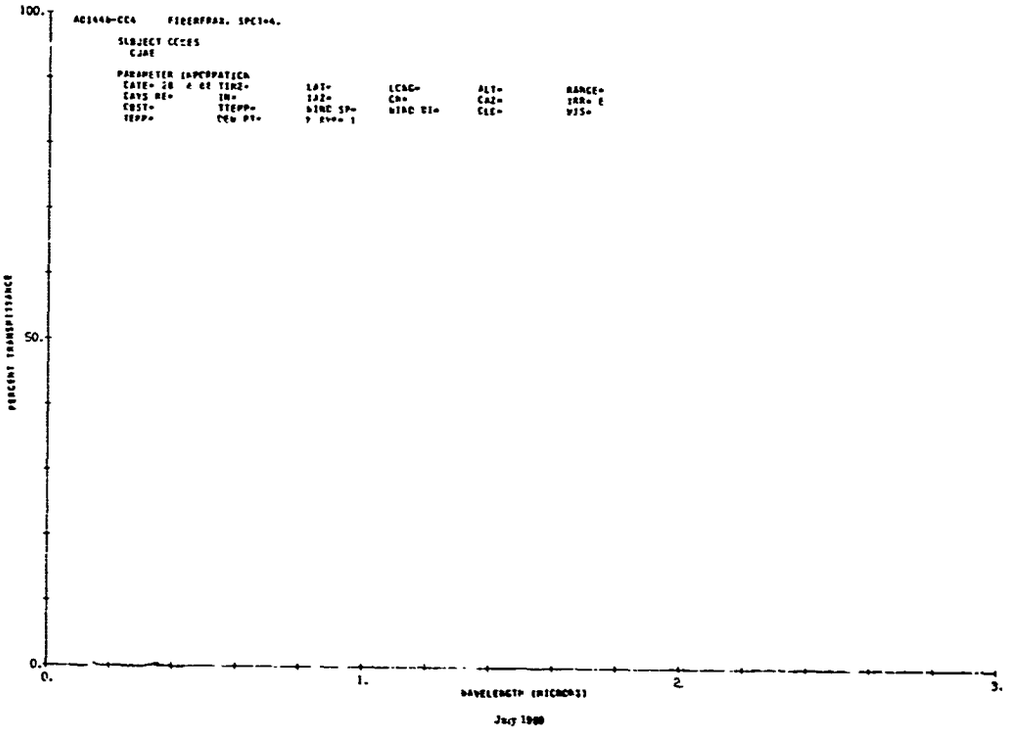
WAVELENGTH (MICRONS)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WIND DI=
ALT=
CAZ=
CLE=
RANGE=
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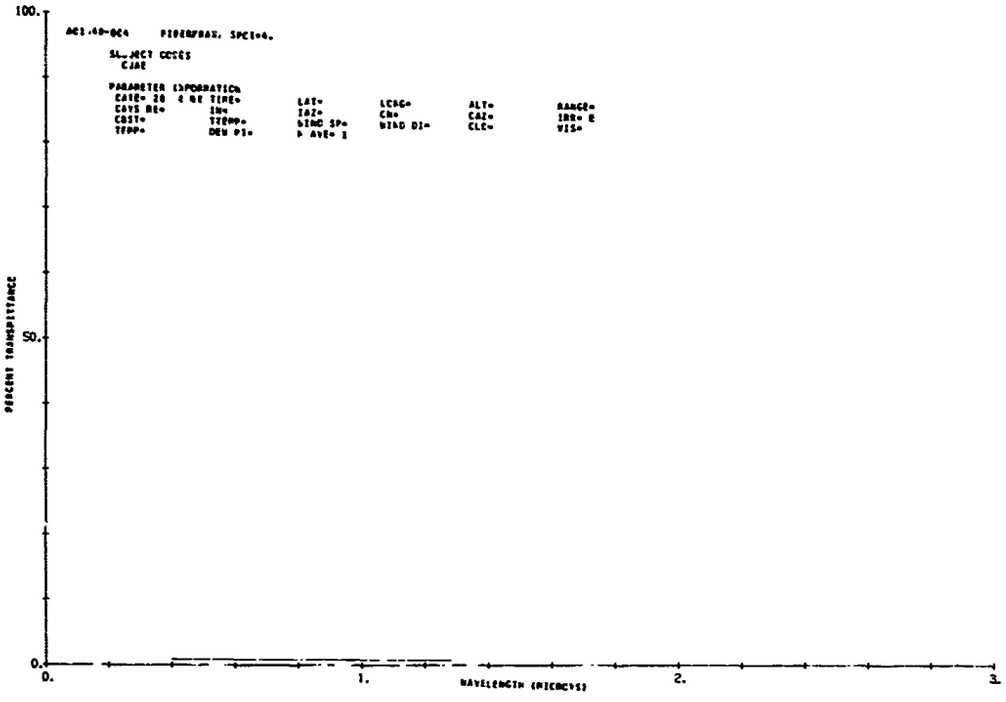
WAVELENGTH (MICRONS)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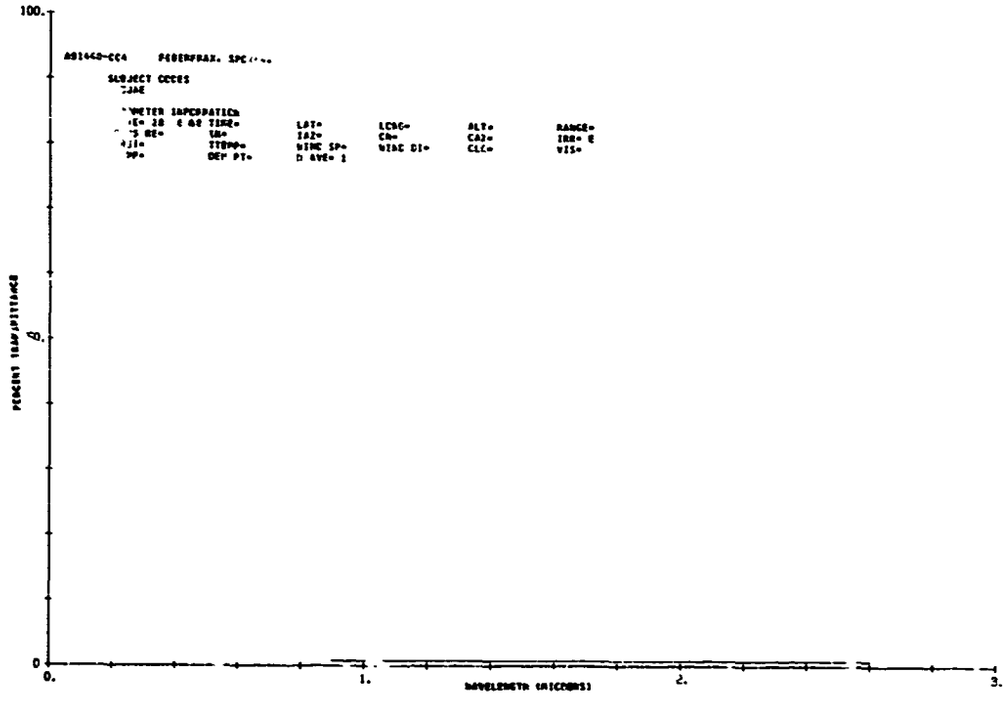
WAVELENGTH (MICRONS)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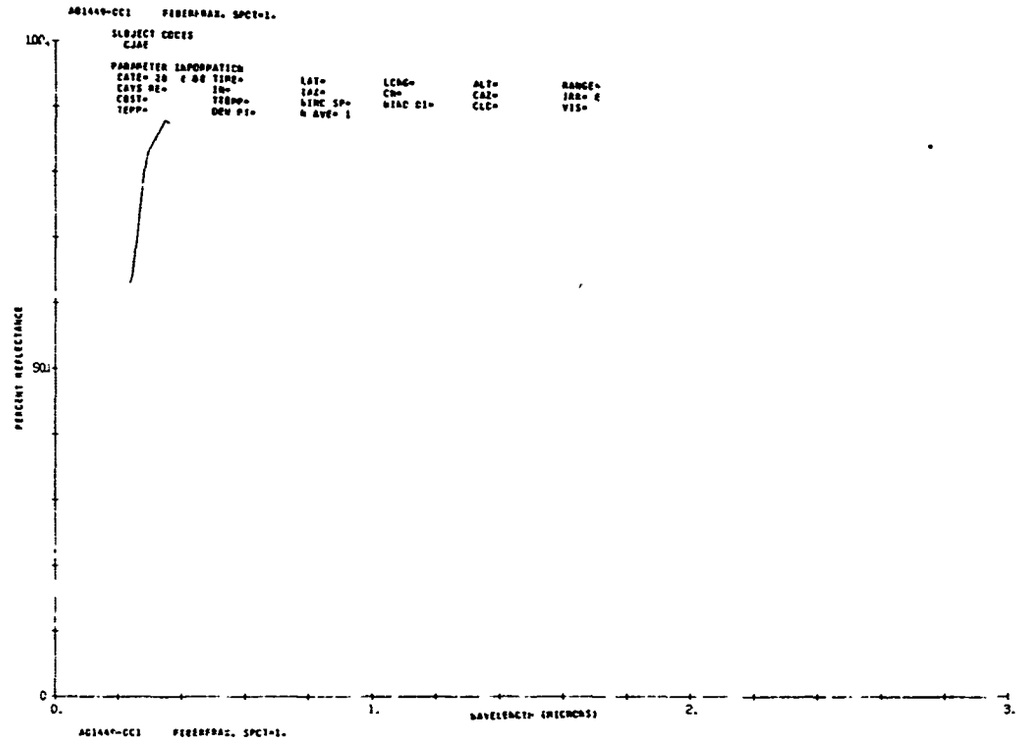
PERCENT TRANSMISSTANCE
WAVELENGTH (MICRONS)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TEMP= DEW PT=
LAT= LONG= ALT= RANGE=
IAZ= CN= CAZ= IRR= E
WIND SP= WIND DI= CLE= VIS=
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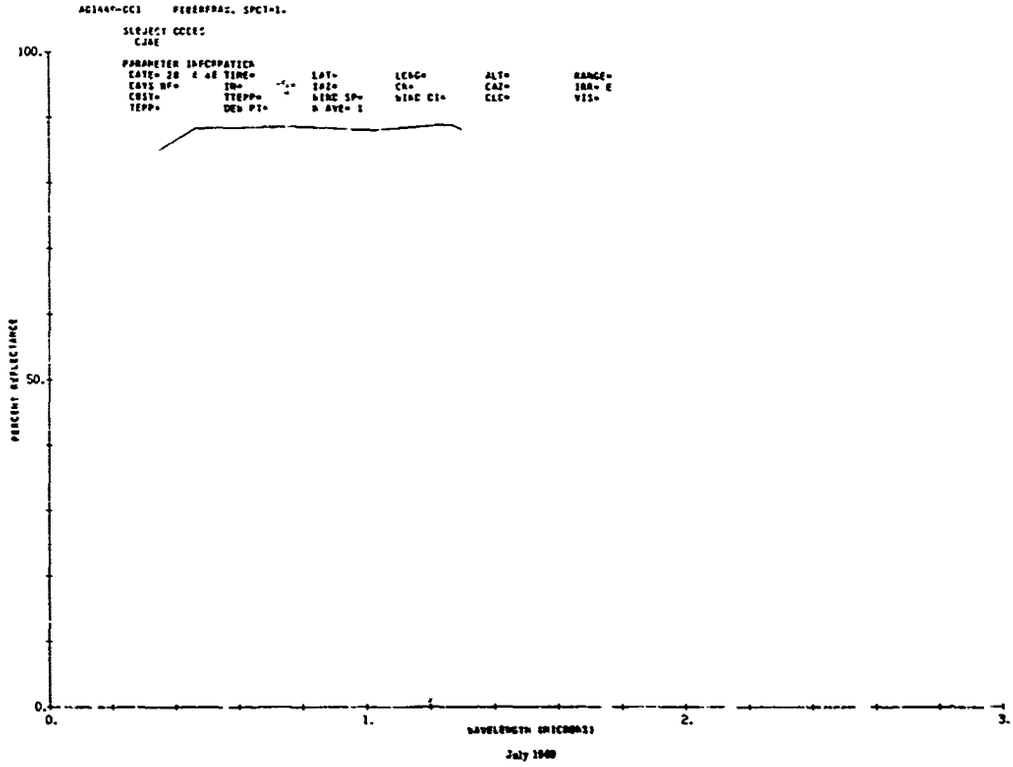
WAVELENGTH (MICRONS)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WIND SP= WIND DI= CLE= VIS=
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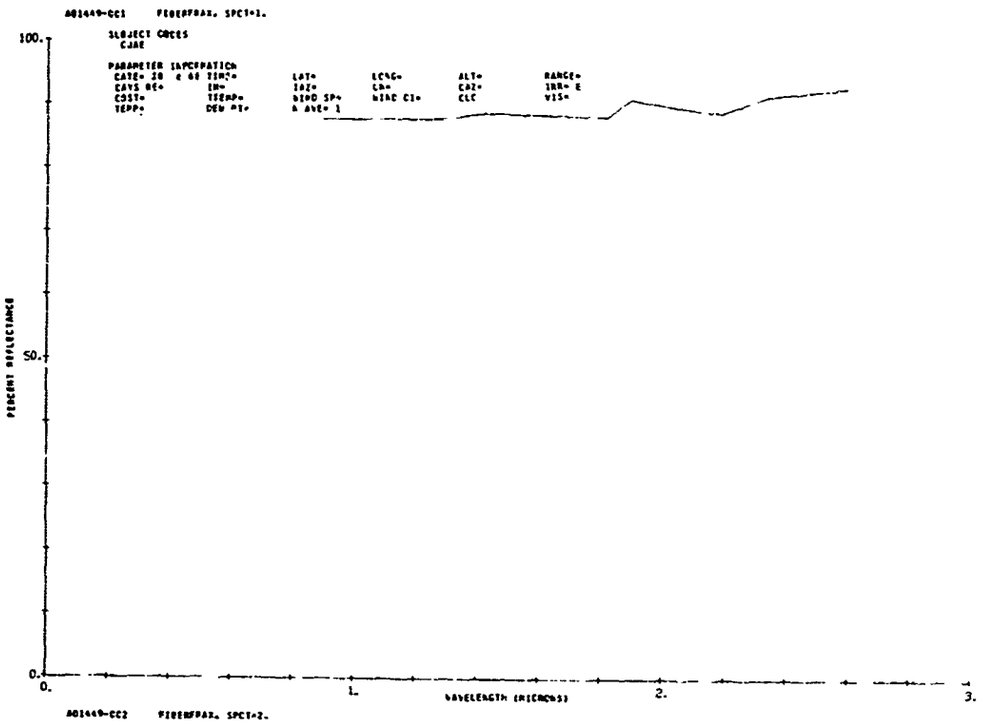
WAVELENGTH (MICRONS)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LAT= LONG= ALT= RANGE=
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PERCENT REFLECTANCE
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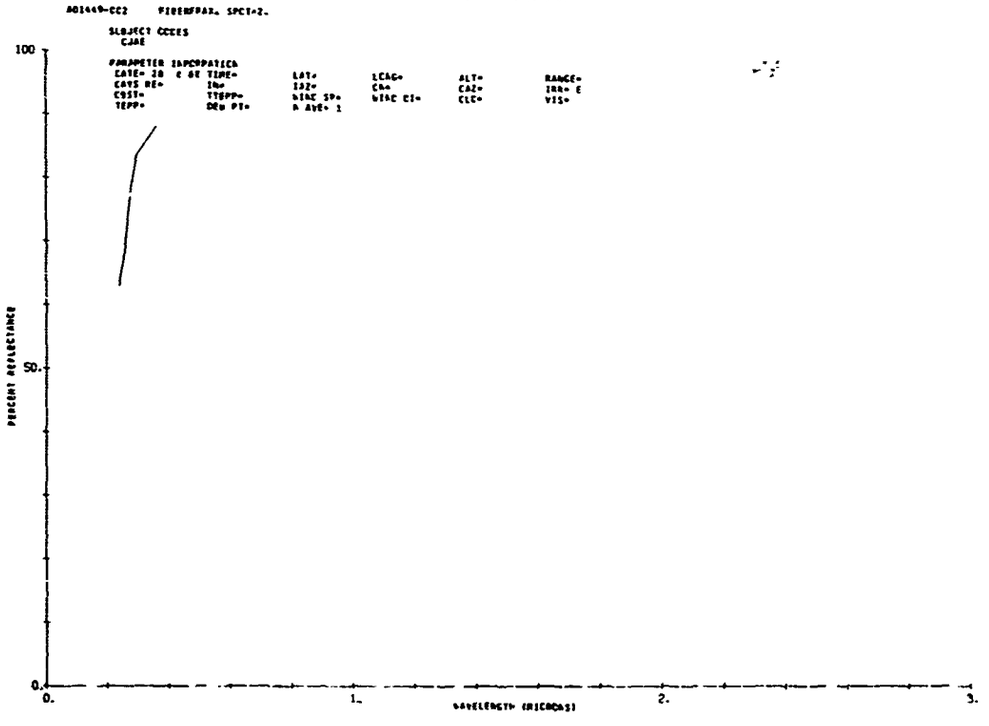
WAVELENGTH (MICRONS)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PARAMETER INFORMATION
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CAYS RE= IN=
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LAT= LONG= ALT= RANGE=
IAZ= CA= CAZ= IRR= E
BIAD SP= BIAC CI= CLC= VIS=
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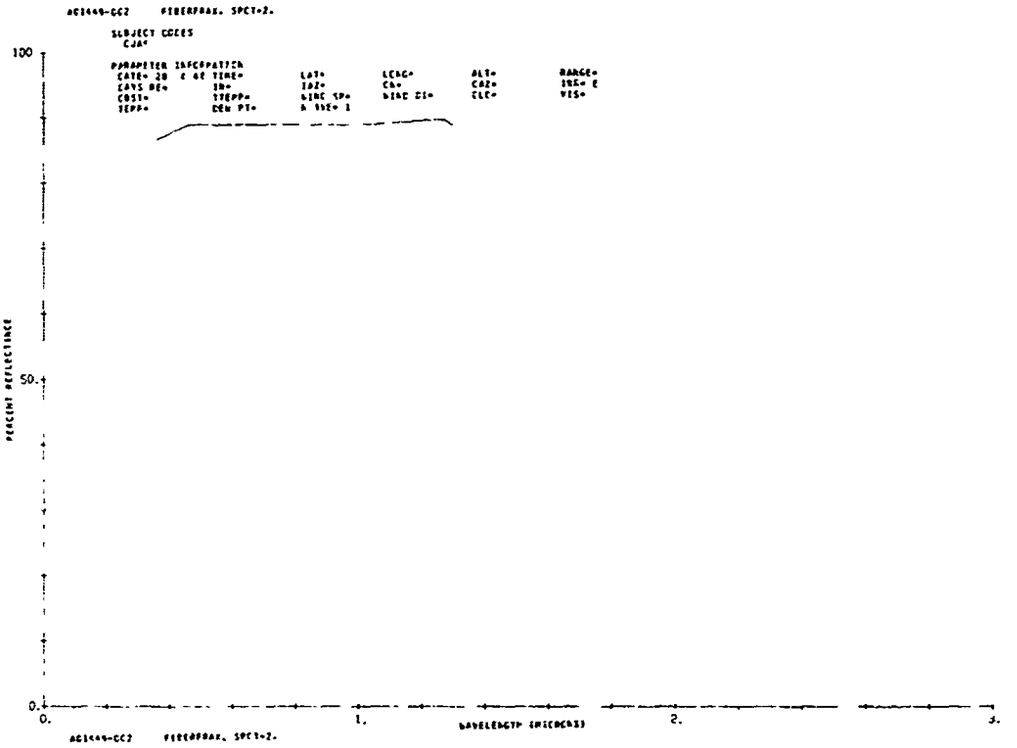
WAVELENGTH (MICRONS)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CA=
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CAZ=
ELE=
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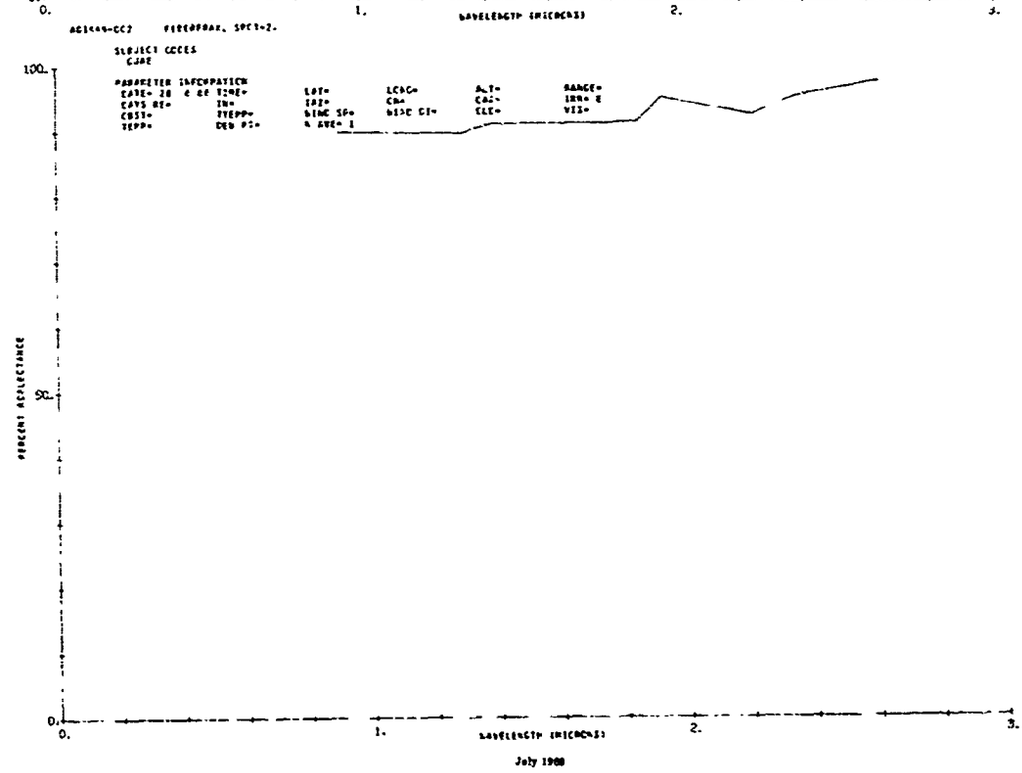
WAVELENGTH (MICRONS)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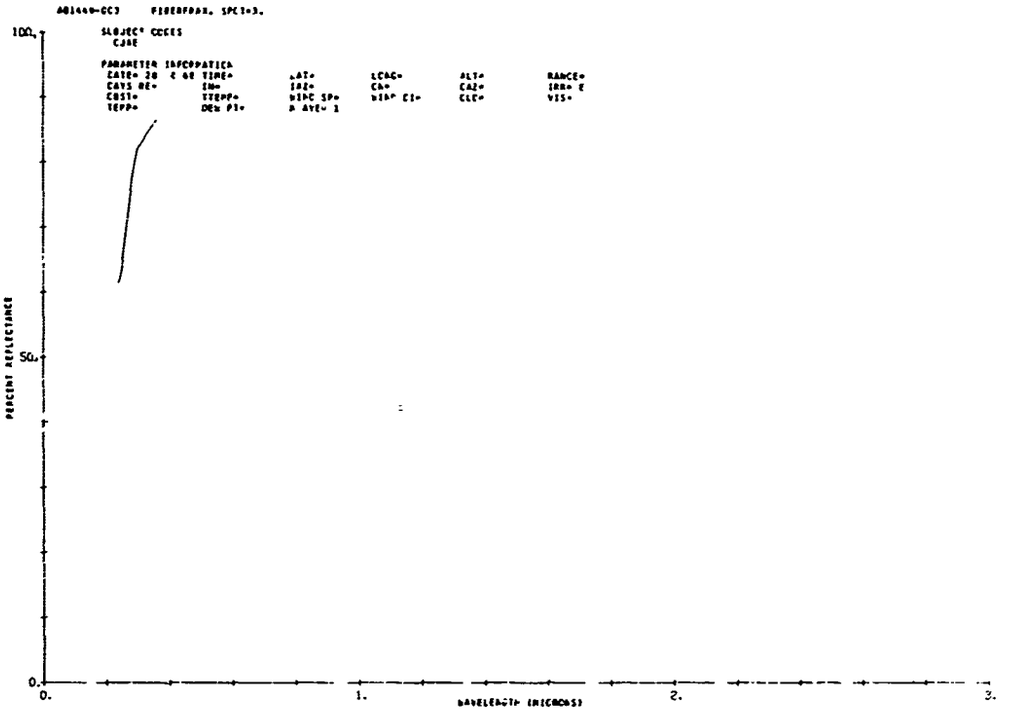
WAVELENGTH (MICRONS)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PERCENT REFLECTANCE
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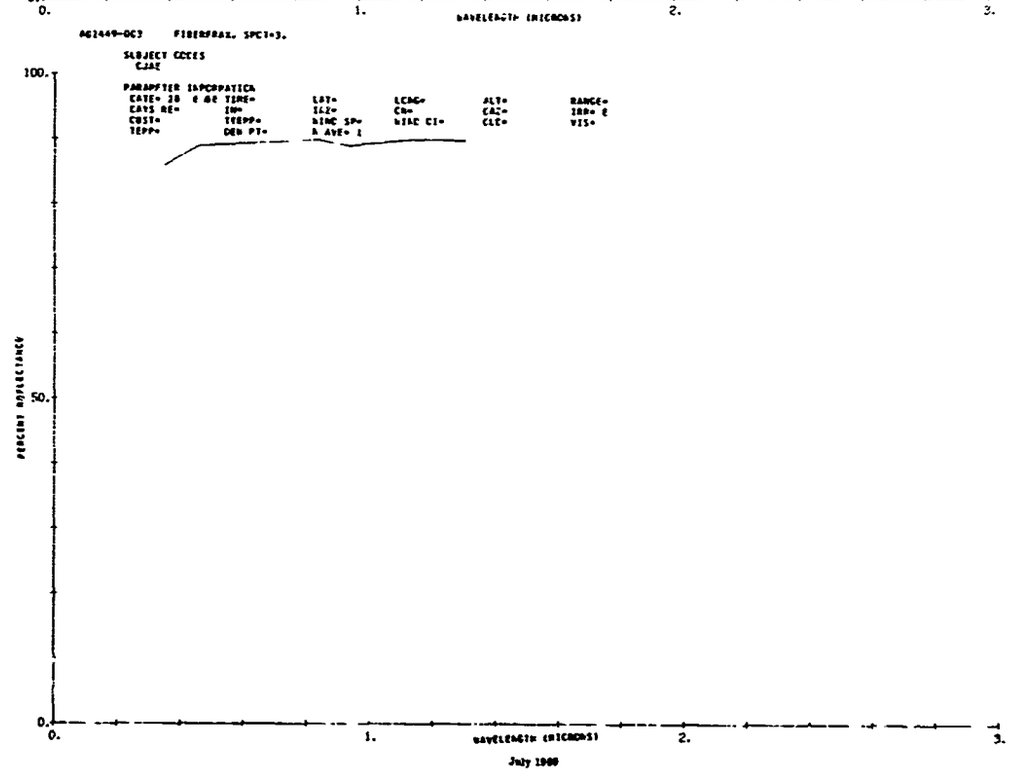
3.
WAVELENGTH (MICRONS)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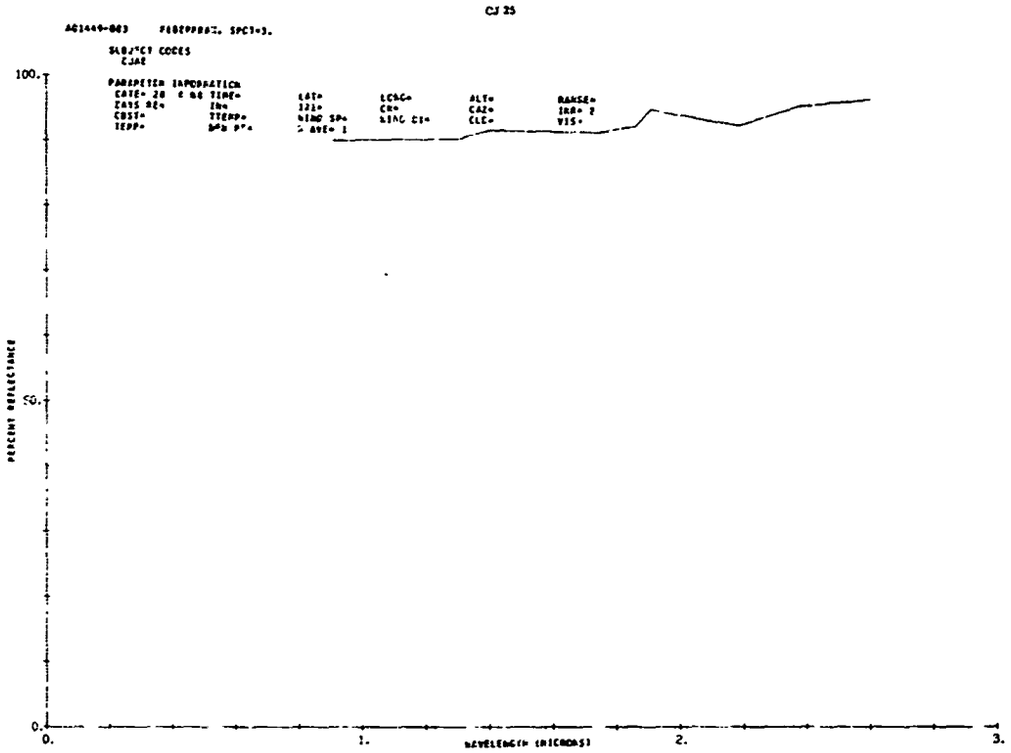
WAVELENGTH (MICRONS)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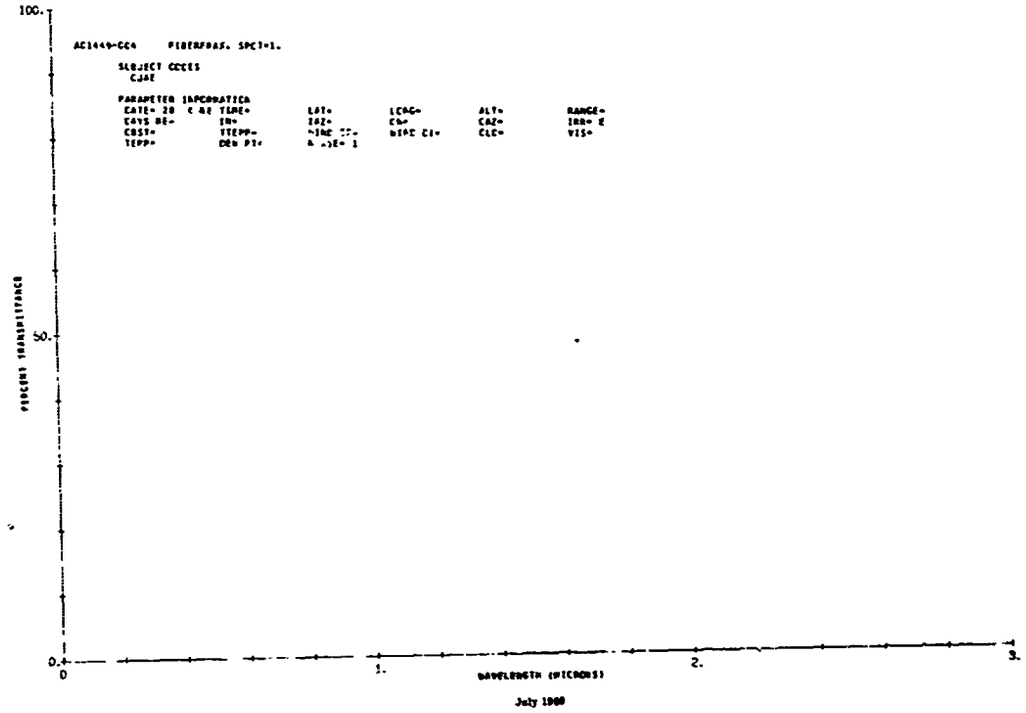
WAVELENGTH (MICRONS)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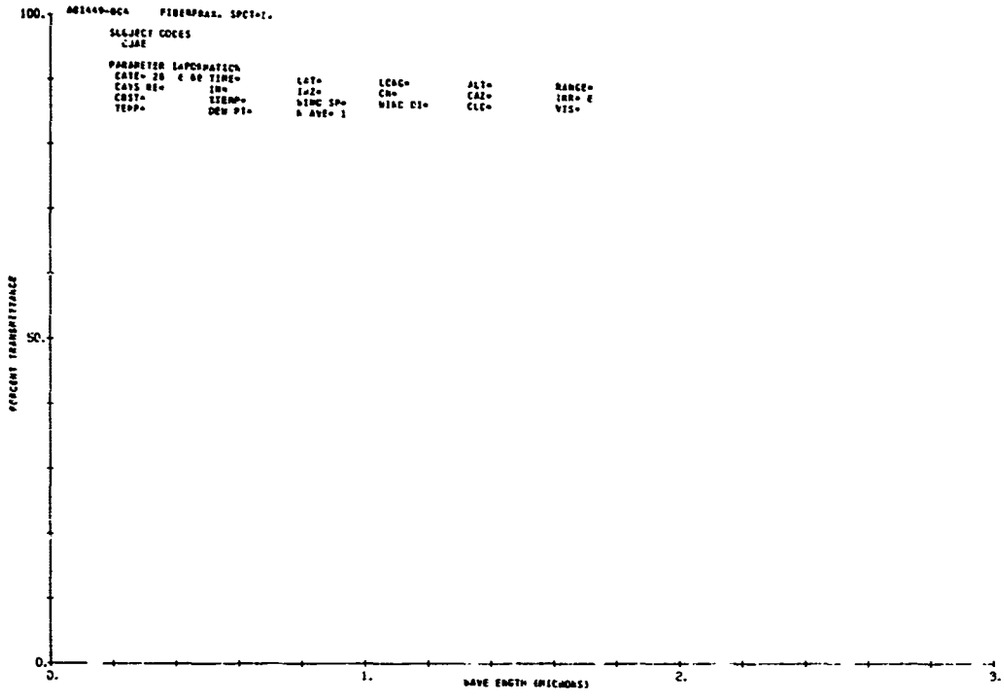
WAVELENGTH (MICRONS)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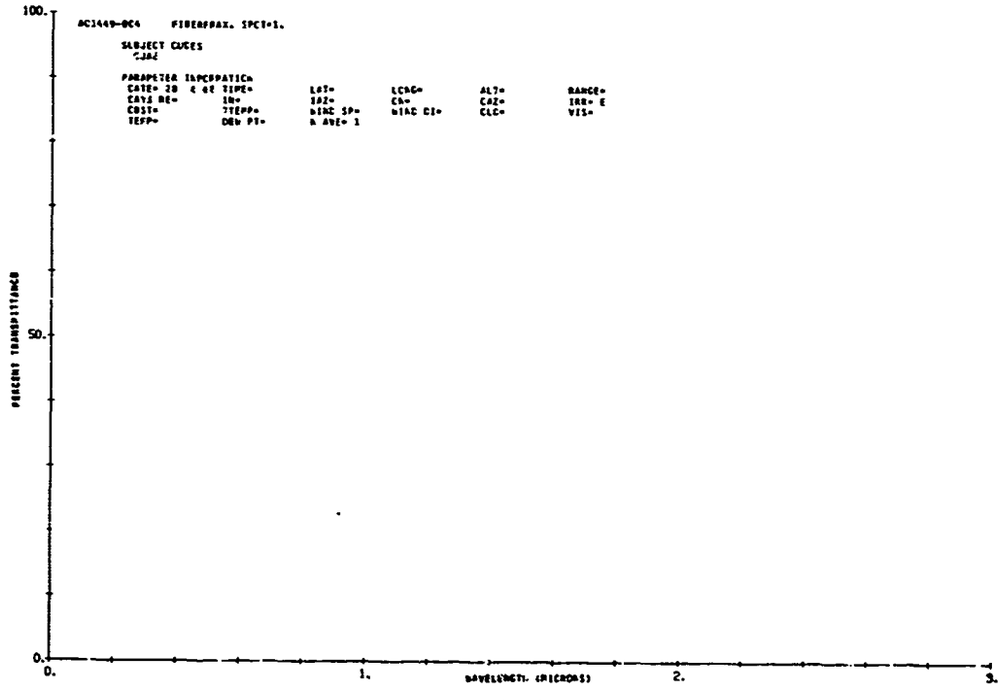
PERCENT TRANSMITTANCE
WAVE LNGTH (MICRONS)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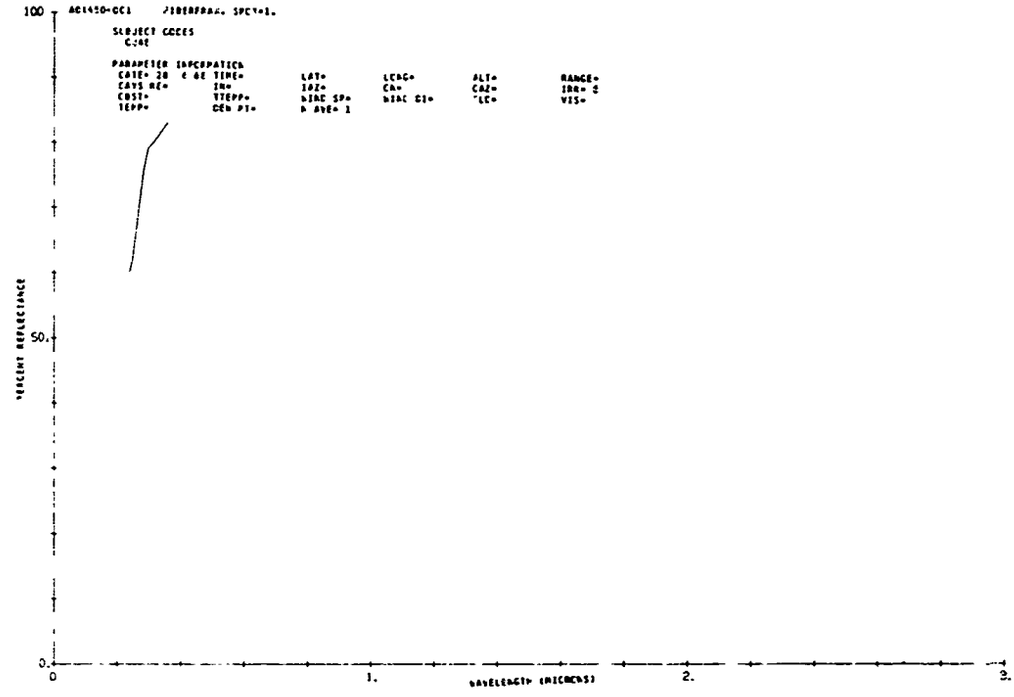
PERCENT TRANSMITTANCE
WAVELENGTH (MICRONS)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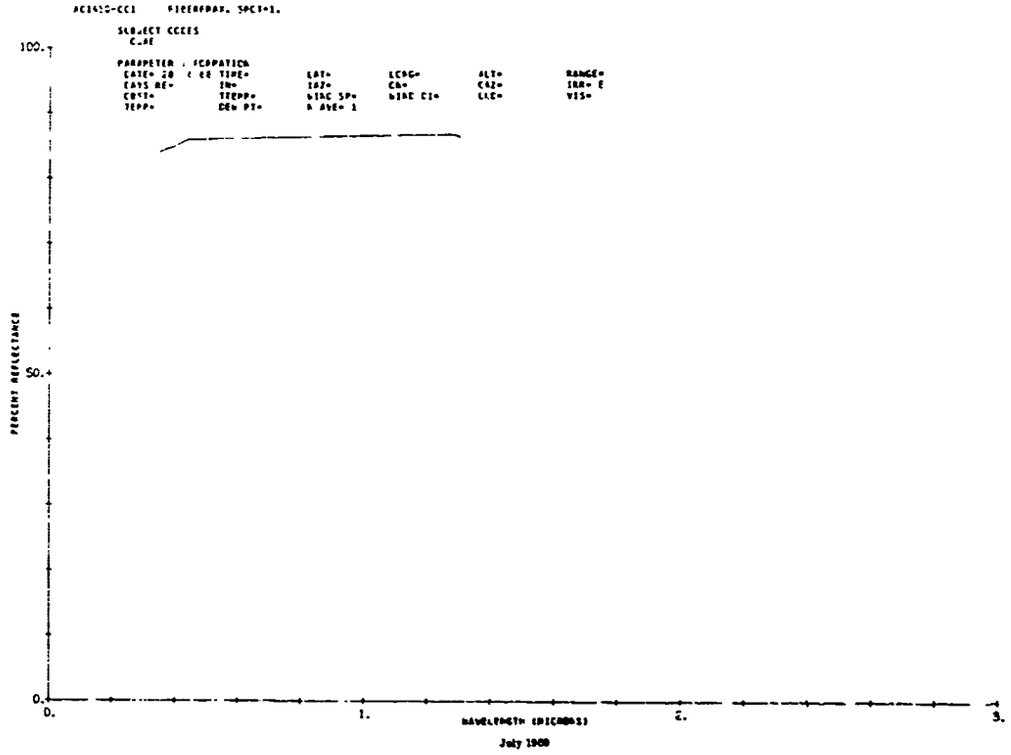
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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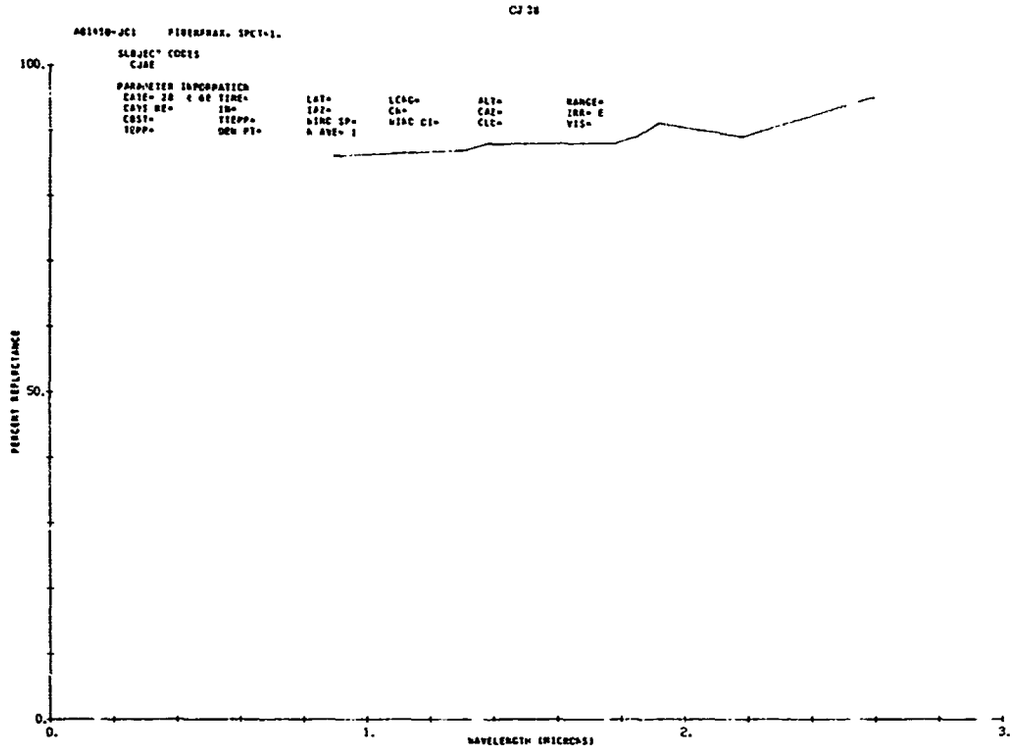
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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RANGE=
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CN=
CAZ=
IRR= E
TTEPP=
BINC SP=
BINC CI=
CLE=
VIS=
DEN PT=
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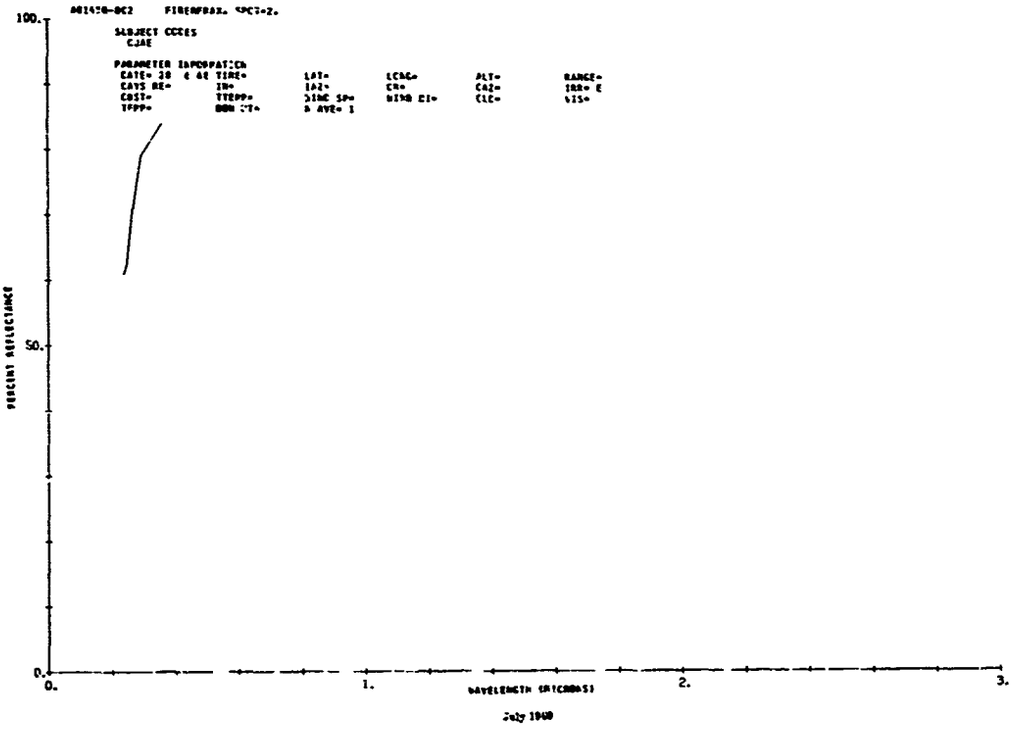
3.
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)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TTEPP=
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BINC CI=
CLE=
VIS=
DEN PT=
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3.
PERCENT REFLECTANCE
WAVELENGTH (MICRONS)

AG1450-GC2 FIBERFRAX. SPCT=2.

SUBJECT CODES
CJAE

PARAMETER INFORMATION
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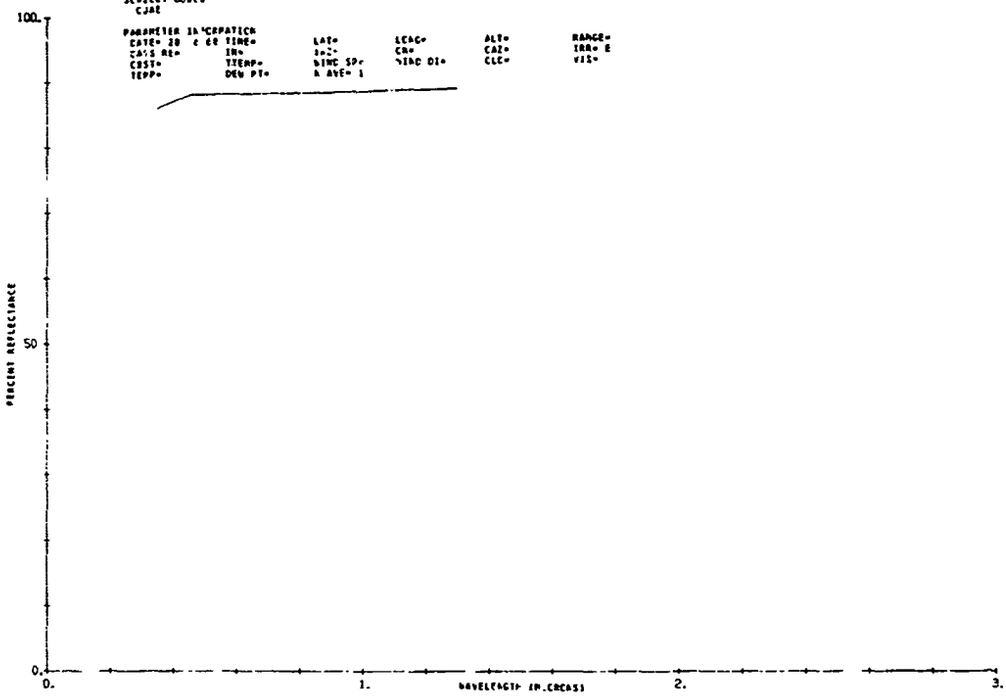

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SUBJECT CODES
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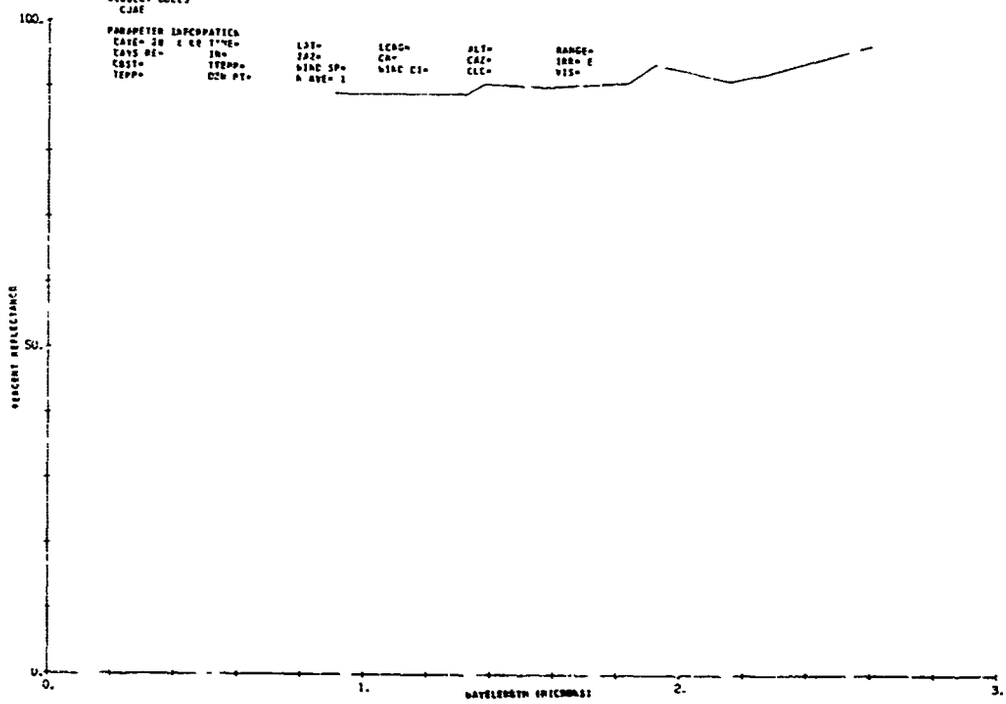

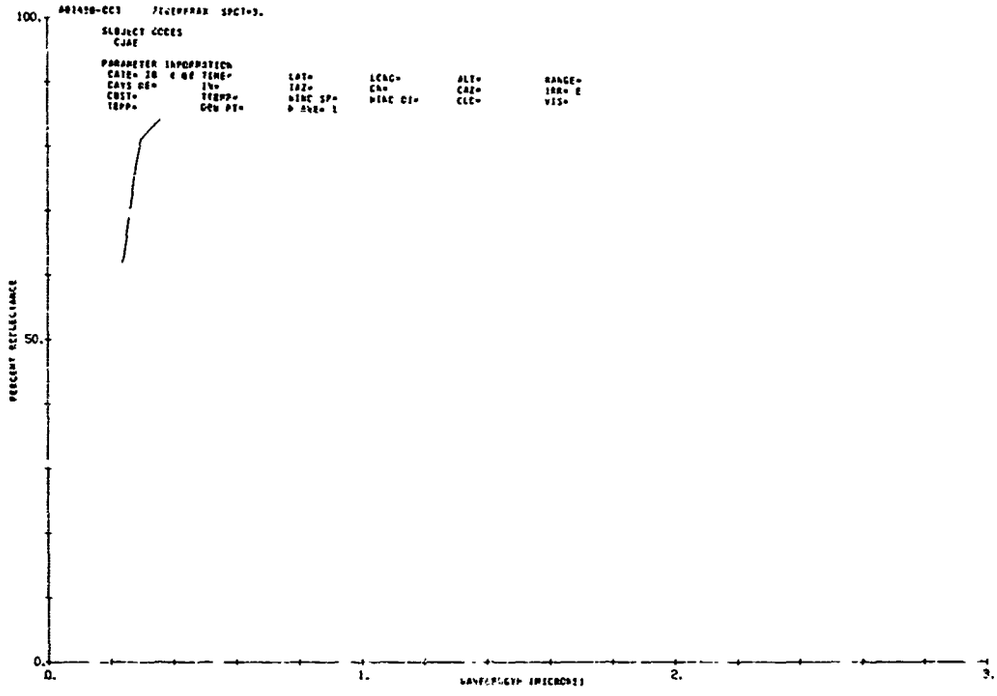
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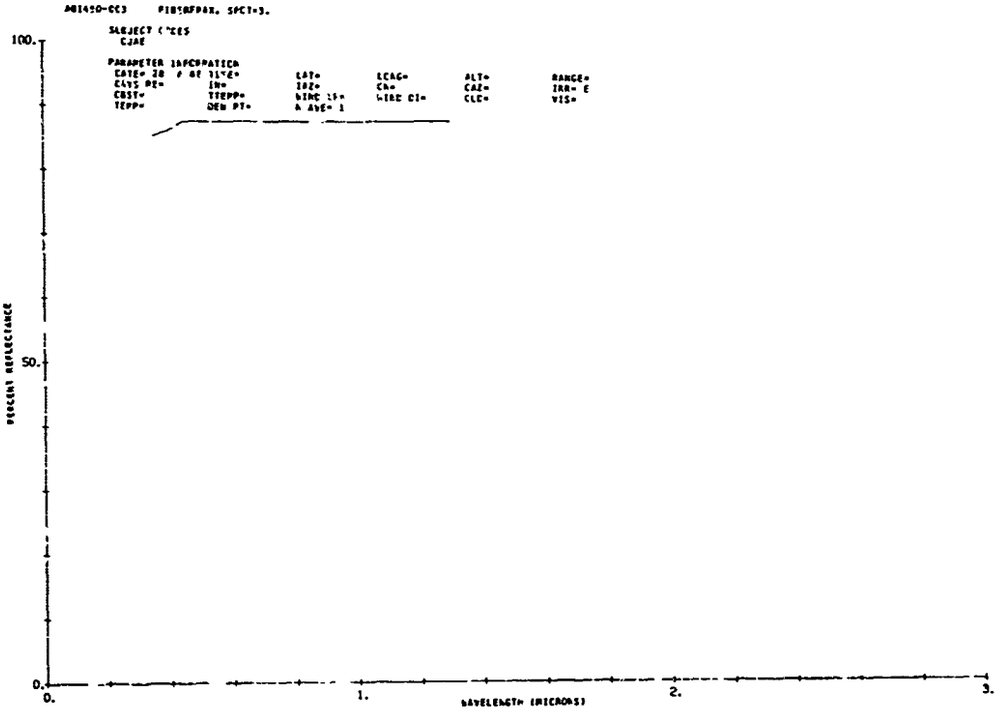
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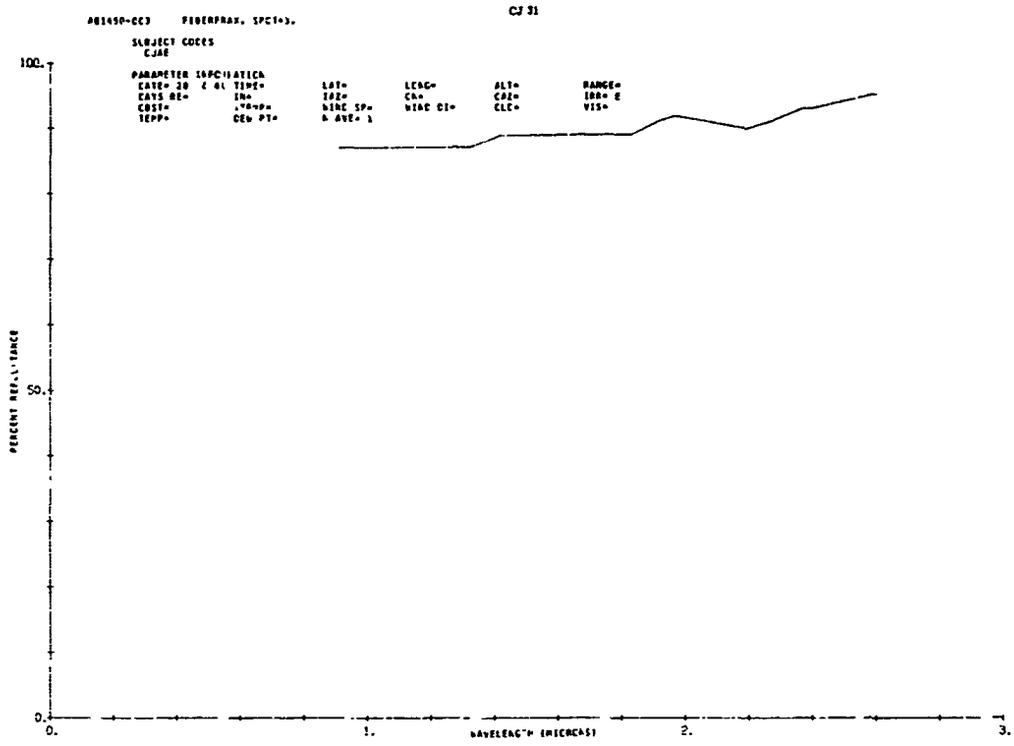
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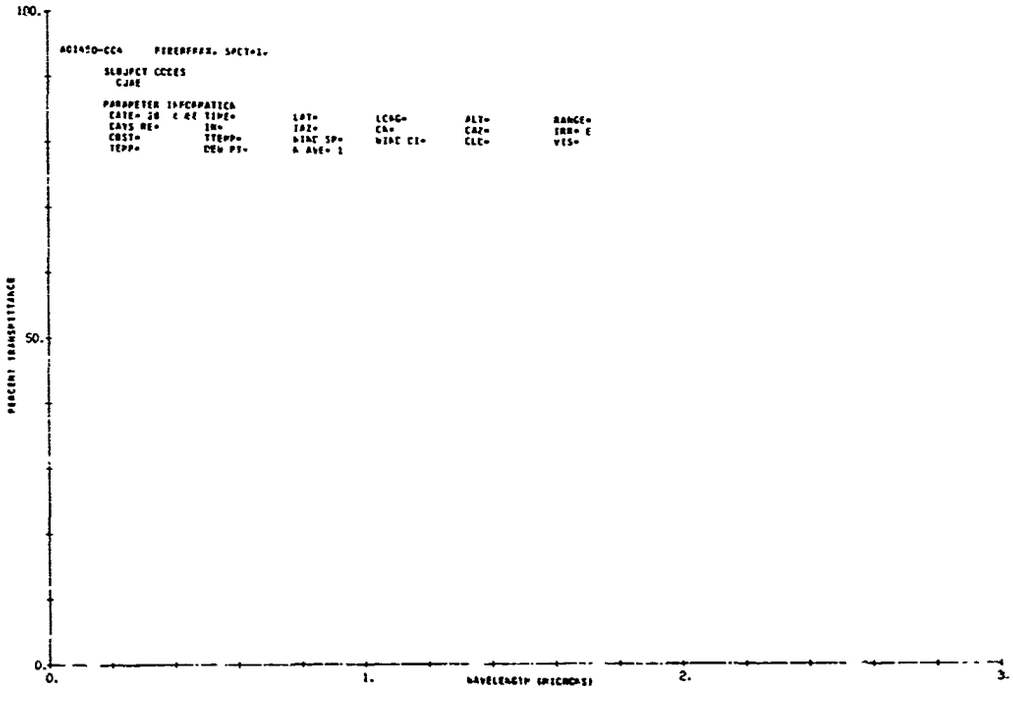
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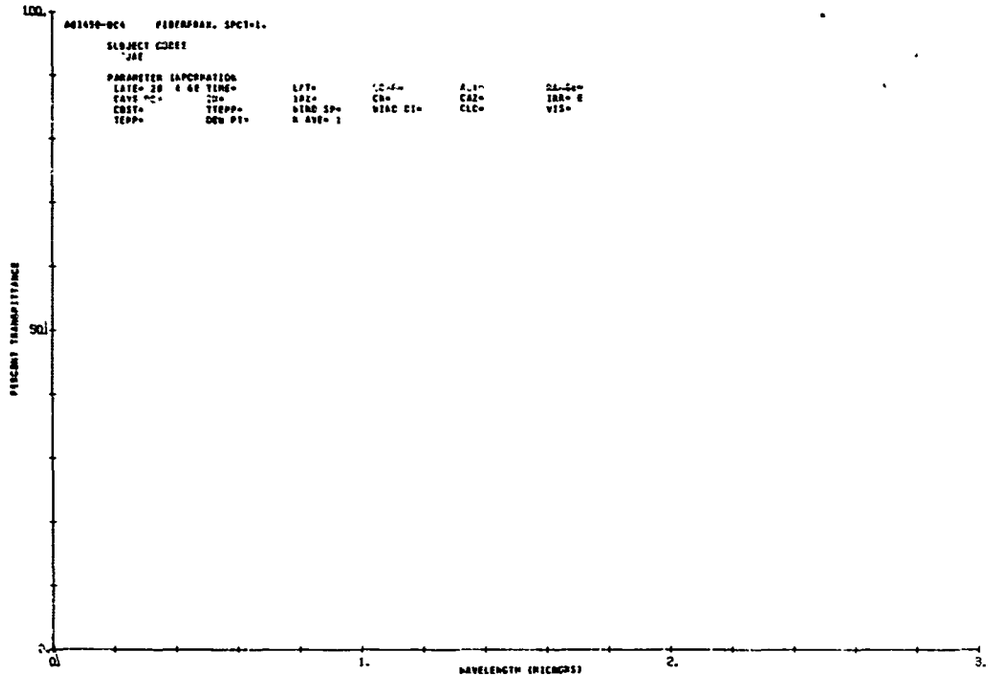
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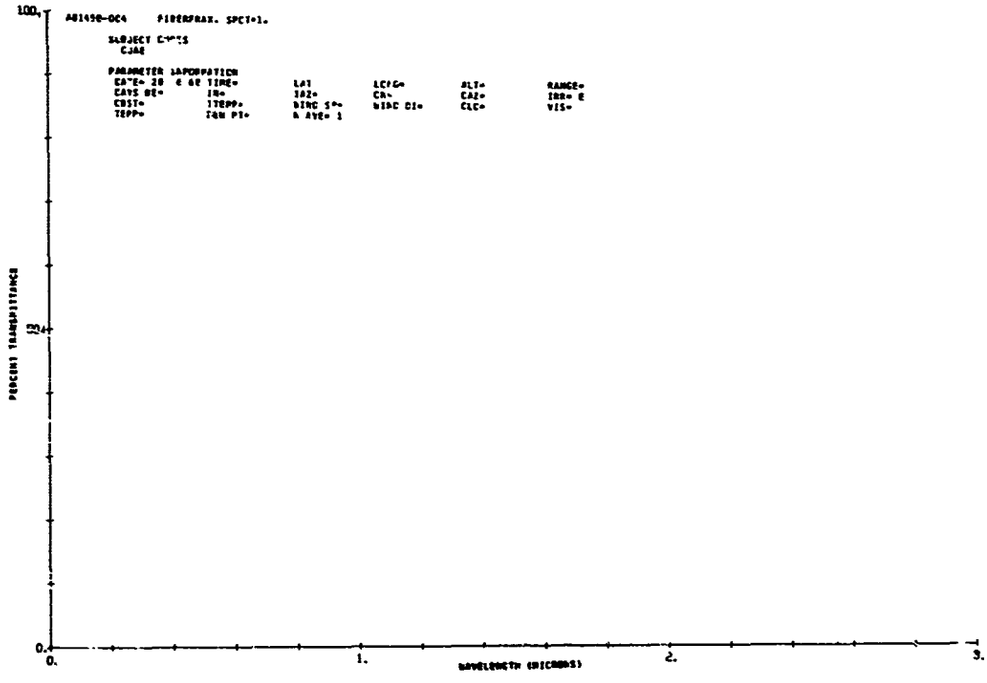
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WAVELENGTH (MICRONS)

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11 SUPPLEMENTARY NOTES	12 SPONSORING MILITARY ACTIVITY Air Force Avionics Laboratory, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio

13 ABSTRACT

This supplement to the Target Signature Analysis Center: Data Compilation augments an ordered, indexed compilation of reflectances and radar cross sections of target and background materials. The Data Compilation includes spectral reflectances and transmittances in the optical region from 0.3 to 15 μ and normalized radar cross sections (active) plotted as functions of aspect or depressing angle, at millimeter wavelengths. When available, the experimental parameters associated with each curve are listed to provide the user with a description of the important experimental conditions.

This supplement contains an additional 350 reflectance curves in graphical form. These data were obtained from the Laboratory Measurements Phase of the Target Signature Measurements Program conducted at The University of Michigan and sponsored by the Air Force Avionics Laboratory. The unclassified compilation, including these data, consists of about 4650 curves and 112 tables.

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14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Targets						
Backgrounds						
Reflectance						
Optical spectrum						
Radar						
Passive microwaves						
Infrared						